CM-H777RC/H888RC

SONY

AMPS

SERVICE MANUAL

For Technical Service

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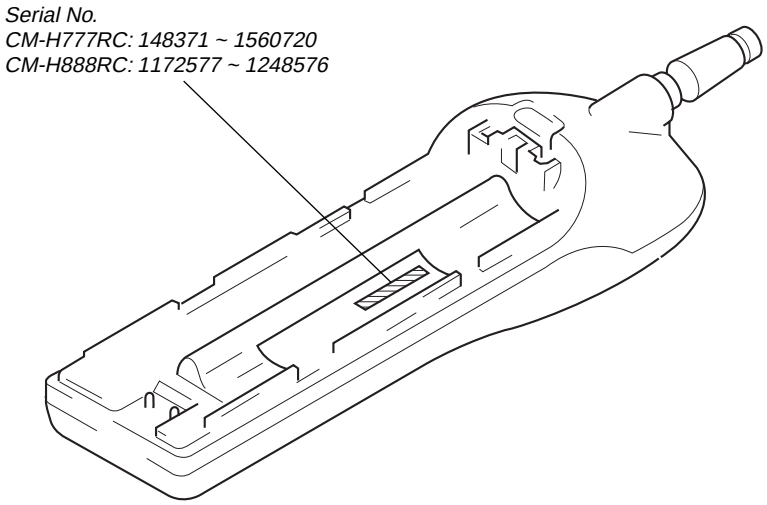
SECTION 1
SERVICING NOTES

• Model Identification



• Combination of Boards

Combination of RAGIC board and Interface board for current CM-H777/H888 and CM-H777RC/H888RC

I/F board / RAGIC board	CM-H777/H888 I/F board	CM-H777RC/H888RC I/F board
CM-H777/H888 RAGIC board	—	OK
CM-H777RC/H888RC RAGIC board	OK	—

Flexible Circuit Board Repairing

- Keep the temperature of the soldering iron around 270 ºC during repairing.
- Do not touch the soldering iron on the same conductor of the circuit board (within 3 times).
- Be careful not to apply force on the conductor when soldering or unsoldering.

Notes on chip component replacement

- Never reuse a disconnected chip component.
- Notice that minus side of a tantalum capacitor may be damaged by heat.

Note for the replacement of AT24C32N-10SI-2.7 (U8A)

- IC AT24C32N-10SI-2.7 (E^2 PROM) of RAGIC mounted circuit board is not available itself due to the volume data characteristics for audio and etc. is difference each IC.
  Therefore, the RAGIC board have to replace completely.

SECTION 2
CIRCUIT DESCRIPTION

2-1. LOGIC CIRCUIT DESCRIPTION

The functional block diagram is shown in LOGIC CIRCUIT BLOCK DIAGRAM.
The logic circuit consists of the following parts.

- MPU (including Digital processor)
- EEPROM, 32 kbits
- FEEPROM, 128 kbytes
- Audio signal processor
- Power supply IC
- LCD driver (Interface Board)
- 20-digit dot matrix liquid crystal display (Interface Board)

The audio from the microphone is amplified at the microphone amplifier, goes through the analog switch and transmit audio is input at the transmit-audio terminal. The analog switch can be turned off with Command 5100 (Change-path) of the test set when the characteristics of transmit audio of the radio unit is measured.

The audio is compressed at the compressor. The compressor output does through the band pass filter, pre-emphasis, deviation limiter, and post-deviation filter, and is added with the control signal at the audio signal processor. The summed signal is applied to the modulation input terminal of the radio portion.

The demodulated signal from the receiver goes through the de-emphasis circuit in the audio signal processor, the band pass filter and the expander, and is added at the summing amplifier with the tone signal. The summed signal is applied to the receive audio terminal.

Analog SW, Compressor and expander is in the Audio signal processor.

For wideband data transmission, the data signal is first encoded into the BCH code with the software for the MPU. The BCH code is sent via the 8-bit data bus to digital processor (KE5A220 or KE5A221). The parallel data bus is converted to serial data to the 32-bit shift register of digital signal is sent to the audio signal processor.

In the audio signal processor, the Manchester code signal goes through analog switch, variable resistor T.DATA VR5 (variable from +1.6 to –1.4 dB in 0.2 dB steps), the 4th order low pass filter with 20 kHz cut-off frequency and lastly TX VR3 (variable from –2.5 dB to –15.2 dB in 0.1 dB steps), and then appears at the FMMOD terminal.

Supervisory audio tones (SAT: 6030 Hz, 6000 Hz, 5970 Hz) are demodulated at the radio portion and appears at the FMDEM terminal. The SAT signal is then applied to the logic portion. The SAT signal goes through the band pass filter having the 6-kHz center frequency in the audio signal processor, and is converted to logic level signal through the comparator. The logic level signal is phase-synchronized at the digital phase locked loop in digital processor. The comparator output goes through SAT data remark and, the low pass filter, TSAT VR6 (variable from –9.6 to –14.1 dB in 0.3 dB steps), analog switch in the audio signal processor. Thereafter, the SAT signal takes the same signal processing route as the wide band data signal.

Dual Tone Multipul-Frequency signal is generated at the audio signal processor, and the signal is converted into sine wave. Then the sine wave signal is passed through DTMF VR10. After that, the signal takes the same signal processing route as voice.

Wide band data signal is applied to the audio signal processor via FMDEM terminal, and is converted into the logic level signal at the comparator. Then the signal goes to the digital processor (KE5A220 or KE5A221) and acquires bit synchronization at the digital phase locked loop circuit. Next, the signal is converted into non-return zero signal from Manchester code at the integrated and dump circuit. From this signal Barker code (11100010010) is detected at the word synchronizing detection circuit, and then the information and parity bit signal (40 bits) is cleaned up by a 3/5 majority vote circuit.

From the signal, syndrome is detected at the syndrome detector, and an interrupt is requested on the MPU to inform the reception of the signal. When an interrupt occurs the software of the MPU allows 28 information bits and 12 parity bits to enter the MPU by way of data bus. The software checks syndrome at first, then will do error correction, if there are any.

2-2. RADIO CIRCUIT DESCRIPTION

2-2-1. General Description

The functional block diagram is shown in the radio circuit block diagram.

Signals received from the cell site pass through the duplexer to the receiver circuit, where they are amplified and demodulated. The received signals may be voice and/or coded signaling information. From the receiver circuit, voice signals and coded signaling information are sent to the logic circuit.

To transmit signals, the Transmitter carrier is frequency-modulation with voice and/or coded signaling information. The carrier is then passed through a duplexer to the antenna.

2-2-2. Synthesizer Circuit

The equipment has two phase-locked-loop frequency synthesizer. One is used to produce the RF modulator. Another one is used to produce the RF signals for 1st local oscillator injections of the receiver.

The synthesizer of 1st local and TX local oscillator (U306) controls an RF signal, between 941 MHz and 966 MHz, or 824 MHz, and 849 MHz according to a DC control voltage. The internal dual modules prescaler divides the signal from the buffer amplifier by 128 or 129. The output of a portion of the programmable divider function determines whether 128 or 129 is a divider. Channel assignment numbers are determined by a 18 bit serial data input sequence from the logic circuit.

The phase detector compares the phases of the two signals from the dividers and drivers the charge pump according to the comparison result. If the loop goes out of lock, the phase detector generates an unlock detect signal.

The charge pump translates the digital output of the phase detector into a current source or sink (depending on the phase information). The low-pass filter integrates this change in correct to produce the DC voltage that controls the VCO (U305 and U404) output frequency.

The 14.4 MHz TCXO (U307) output is divided by 960 to produce the 15.0 kHz reference frequency for the synthesizer.

2-2-3. Transmitter Circuit

The modulator generates transmit signal with VCO and to fed the discrete switch circuit.

The output signal of the discrete switch circuit is fed to the power amplifier (U402).

The output signal of the power amplifier is fed to the directional coupler (U401) and then the duplexer filter (FL401).

A sample of the RF output power is coupled off, and passed through the detector (CR401) and fed to the logic circuit for APC loop.

The p-cont signal from the logic circuit controls power amplifier level controllers (Q403, Q405) to control the power amplifier (U402) output level.

2-2-4. Receiver Circuit

The receiver is a double conversion super-heterodyne receiver, capable of receiving frequencies from 869 MHz to 894 MHz.

The RX signal from duplexer filter (FL401) is amplified by LNA (Q301) with band-pass filter (FL301) and fed to the double balanced mixer (U301).

The synthesizer output signal is also fed to the mixer to obtain the first IF signal (72.06 MHz).

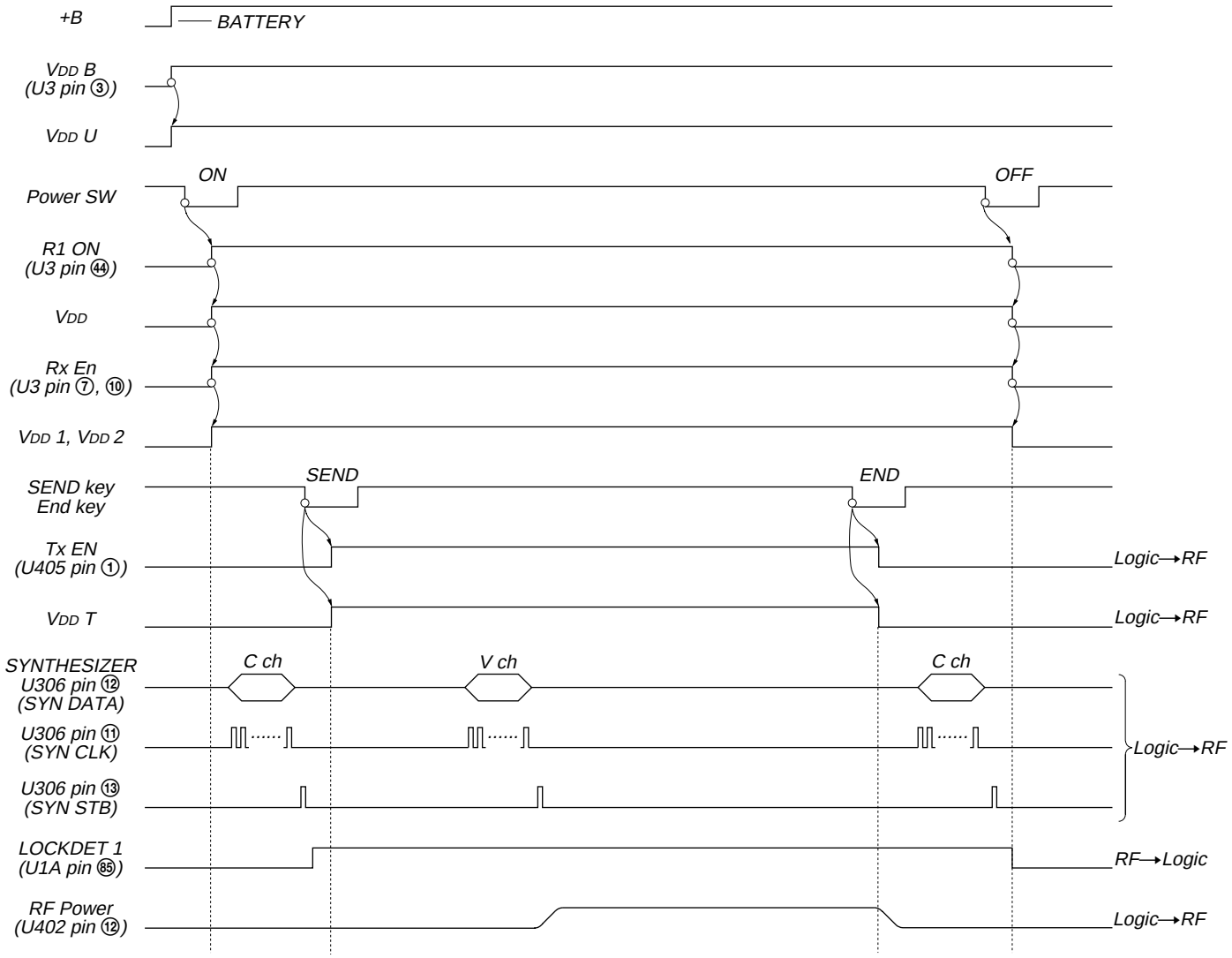
The first IF signal is fed to the second mixer through first amplifier (Q303) and x'tal filter (FL302) and then heterodyned with a fixed 72 MHz second local VCO signal obtain a 60 kHz second IF signal.

The second local oscillator signal is produce by signal synthesizer (U304) and discrete VCO.

After this frequency conversion, the signal second IF fed to the monolithic low-power IF system (U302) incorporating two limiting IF amplifiers quadrature detector, logarithmic signal strength indication (RSSI) and voltage regulator.

The detected output signal and RSSI signal are fed to the logic circuit.

2-3. POWER SUPPLY FLOW CHART

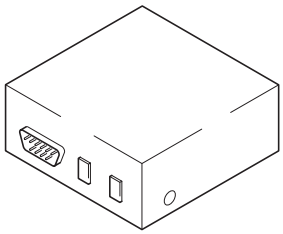


SECTION 3
TOOLS

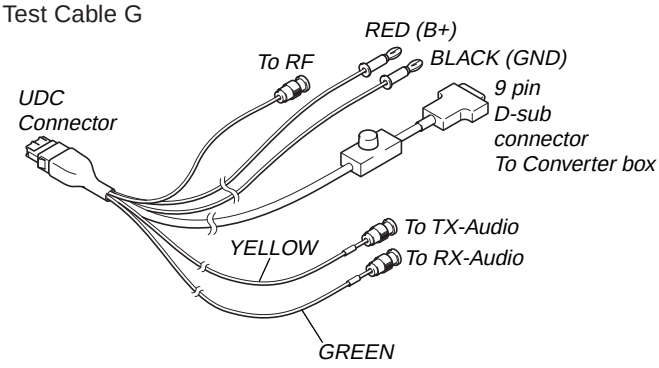
Fig.	Description	Part No.	Remarks
①	LR Screw Bit	3-387-376-01	Special shape Bit For removing the screw of the rear cabinet Assy.
②	Converter Box	3-702-720-01	RC232C Interface Box
③	Test Cable G	3-702-721-01	Test cable for Alignment.
④	Selectable connector 1	3-702-735-01	Connector for monitoring software version
⑤	Test Cable H	3-702-726-01	Test cable for Auto NAM
⑥	Connector 1	3-702-725-01	Connector for monitoring software version
⑦	Floppy disk for User's information	3-702-724-01	
⑧	Floppy disk for Test command	3-702-727-01	Including Test Command for CM-H888 and CM-H333
⑨	ANT driver	3-702-580-01	

① LR Screw Bit

② Converter box (with AC Adaptor)

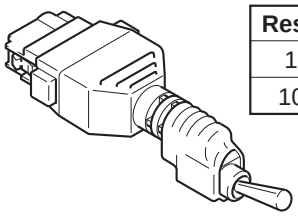


③ Test Cable G



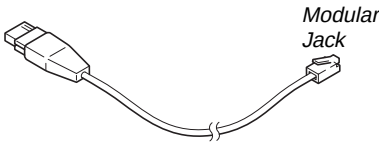
④ Selectable Connector 1

- You can check either a software version or the Lock code.

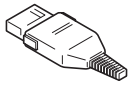


Resistor	Item
1 kΩ	Software ver. display
10 kΩ	Lock code Over-ride

⑤ Test Cable H

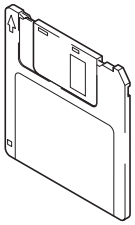


⑥ Connector 1

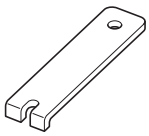


⑦, ⑧ Floppy disk

This floppy disk can be used commonly to CM-H777/H888 and others.

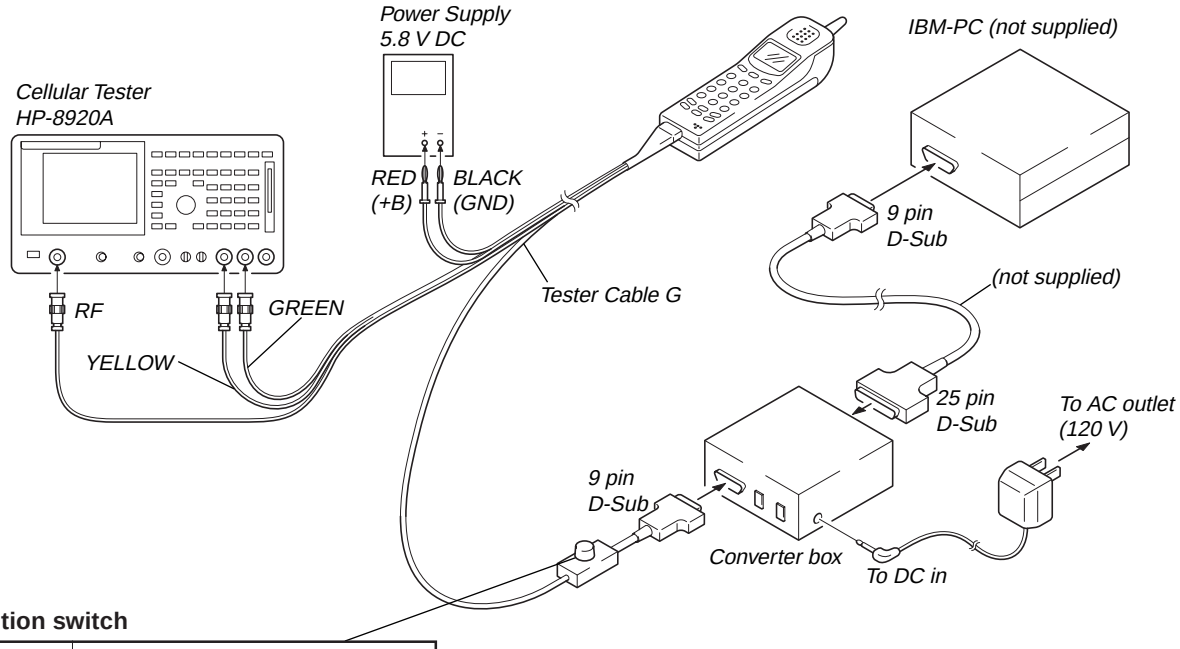


⑨ ANT driver



[Connecting CM-H777RC/H888RC and HP-8920A]

Use test cable G when measuring CM-H777RC/H888RC with HP-8920A.

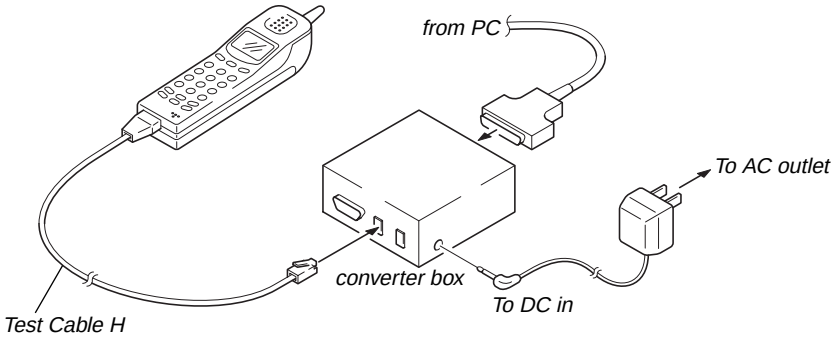


• Volume position switch

	Position	Remarks
Test Cable G	1 kΩ	For software download
	10 kΩ	Alignment, Auto NAM, User's information, Test command
	68 kΩ	Hand-free mode
	open	Hand-set mode

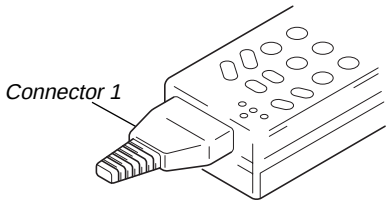
* Set to 10 kΩ

[Connecting CM-H777RC/H888RC and test cable H for Auto NAM]



[Connecting connector 1 to CM-H777RC/H888RC]

You can read the current software version by turning the power on after connecting the connector 1 or selectable connector 1 first.



Connect the connector 1 first, and then turn the power on.

LCD Display

Ready
–210201–

[HP8920 test condition for alignment program]

1) RF Cable loss setting
   ① Press key “SIFT” + “CONFIG”
   ② Set RF Level offset “ON”
   ③ Set RF IN/OUT “–0.7” dB (Input RF cable loss)

2) Adjust TX power levels
   ① Press key “TX TEST”
   ② Setting Tune mode “Auto”

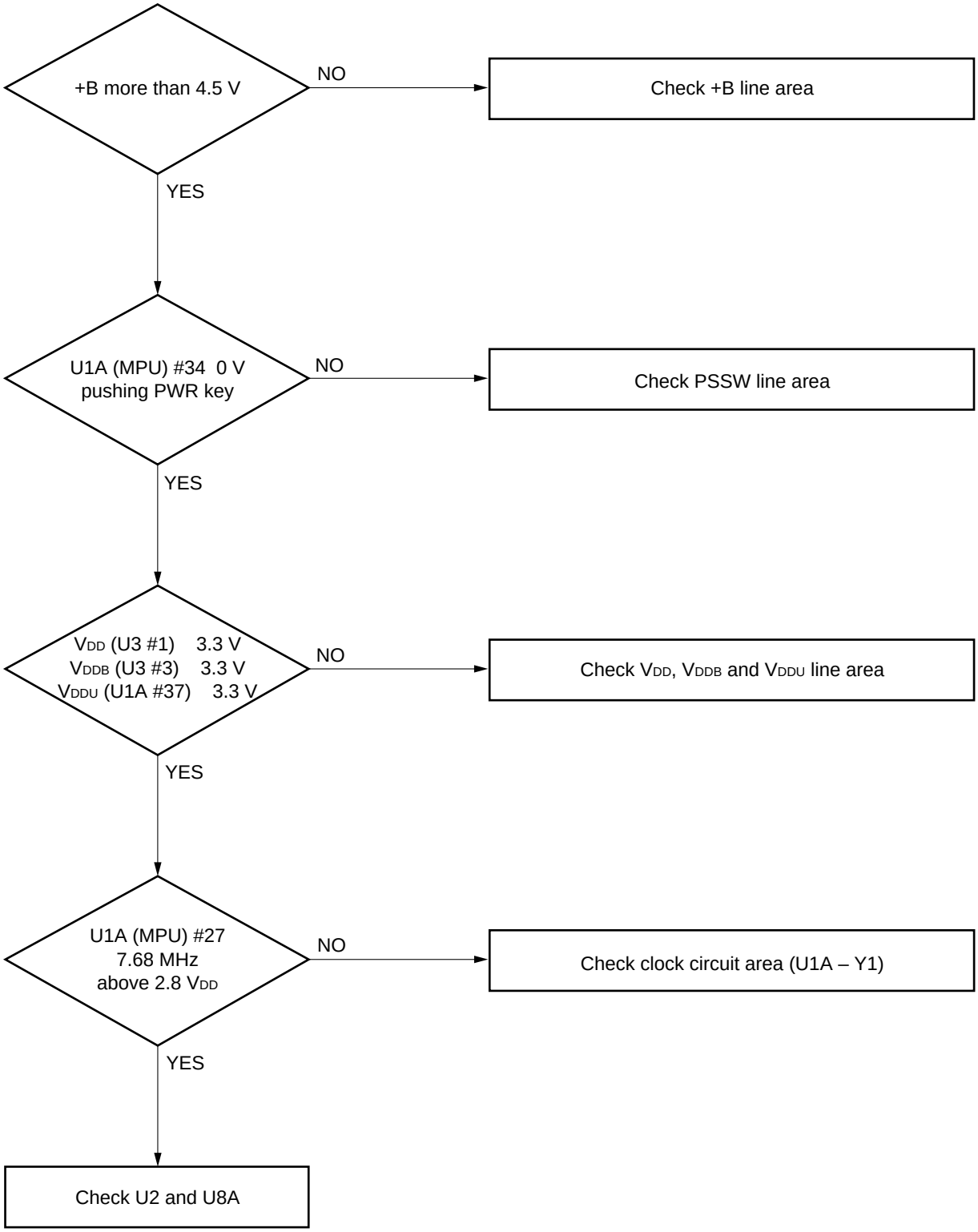
3) Adjust signal modulation
   ① Press key “TX TEST”
   ② Setting condition at HP8920A in accordance with the display of the computer
   ③ Setting Tune mode “Auto”
   ④ Setting AF Anl In “FM Demod”
   ⑤ Setting Detector “RMS*SQRT2”
   ⑥ Setting IF Filter “230 kHz”
   ⑦ Setting Filter 1 “300 Hz HP”
   ⑧ Setting Filter 2 “15 kHz LP”
   ⑨ Setting De-Emphasis “off”

4) Adjust demodulation
   ① Press key “RX TEST”
   ② Setting condition at HP8920A in accordance with the display of the computer
   ③ Setting Load “600 Ω”
   ④ Setting Filter 1 “300 Hz HP”
   ⑤ Setting Filter 2 “C-MESSAGE”

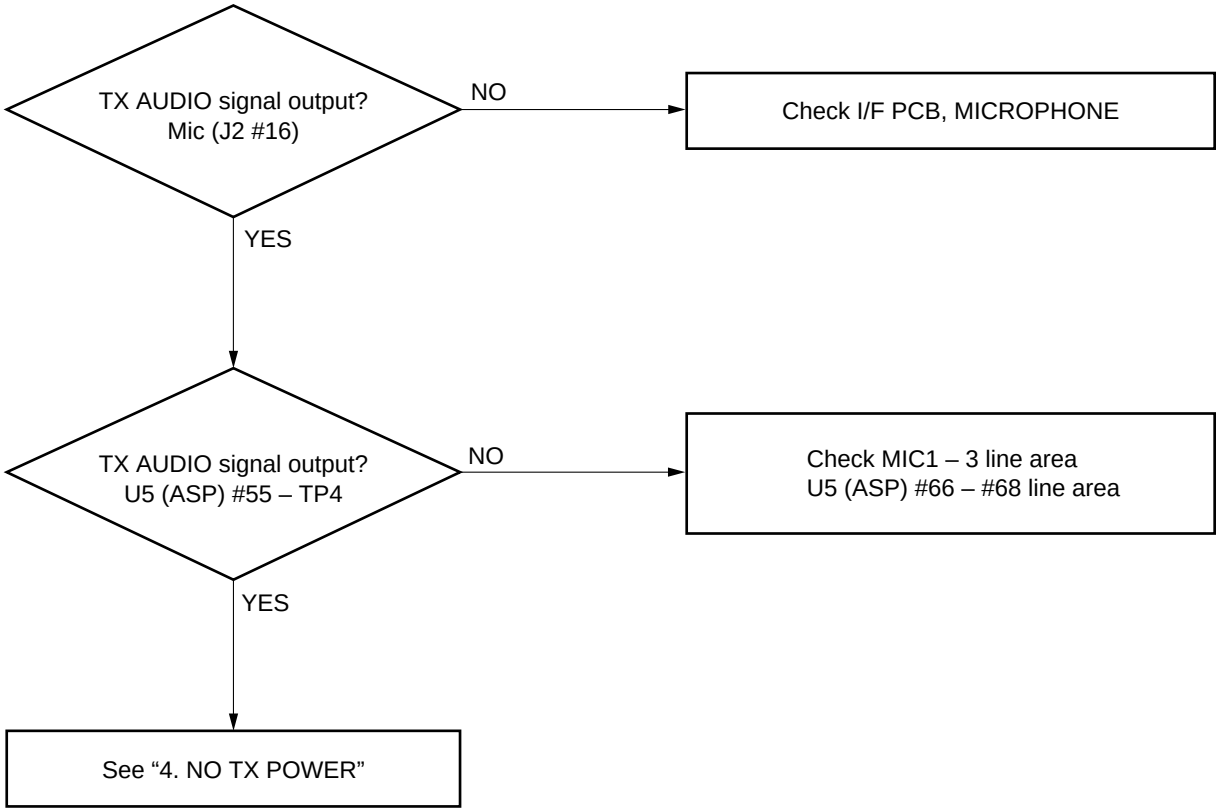
5) Adjust RSSI thresholds
   ① Press key “RX TEST”
   ② Setting condition at HP8920A in accordance with the display of the computer

SECTION 4
TROUBLE SHOOTING

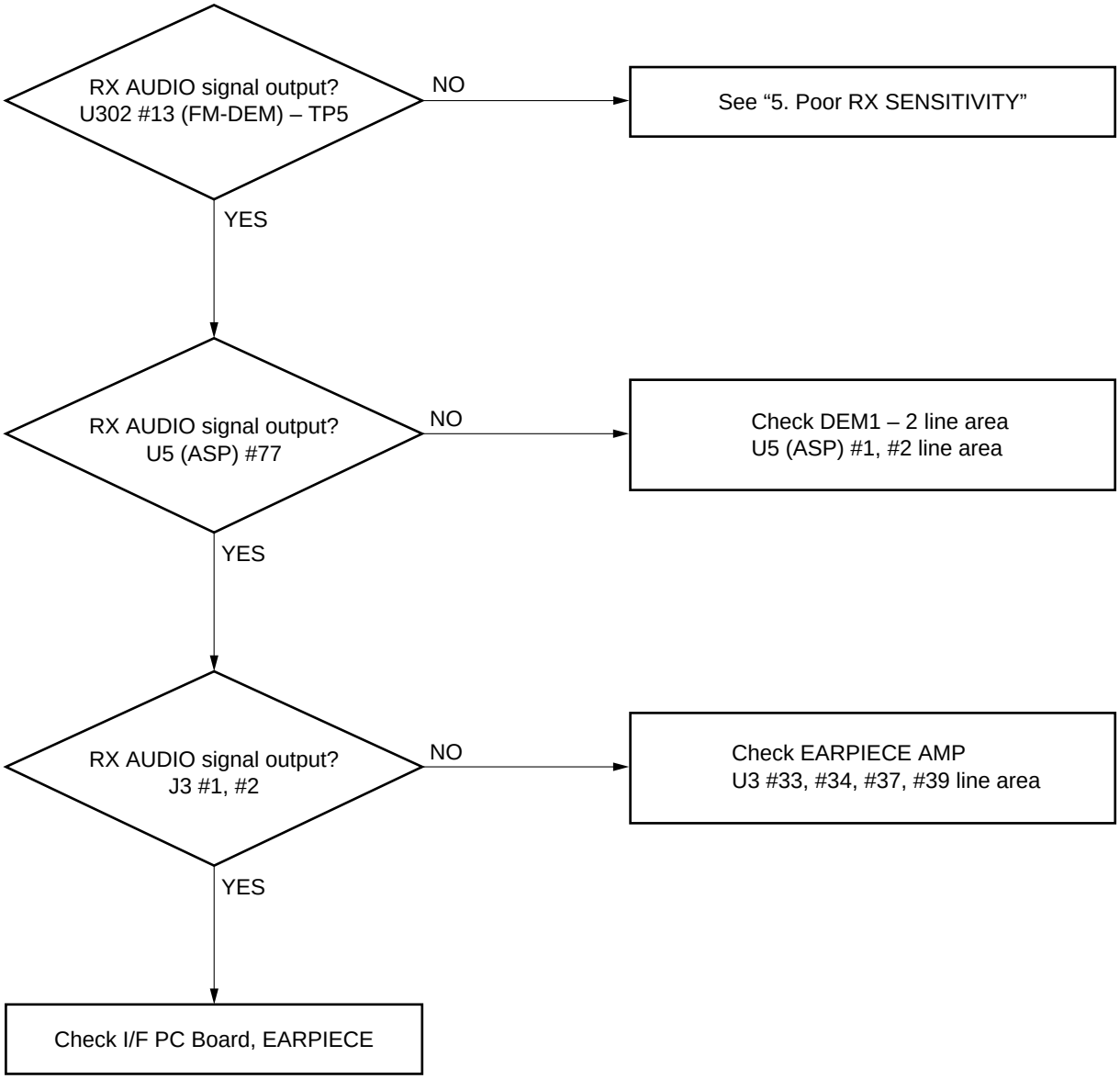
4-1. Cant't power supply on



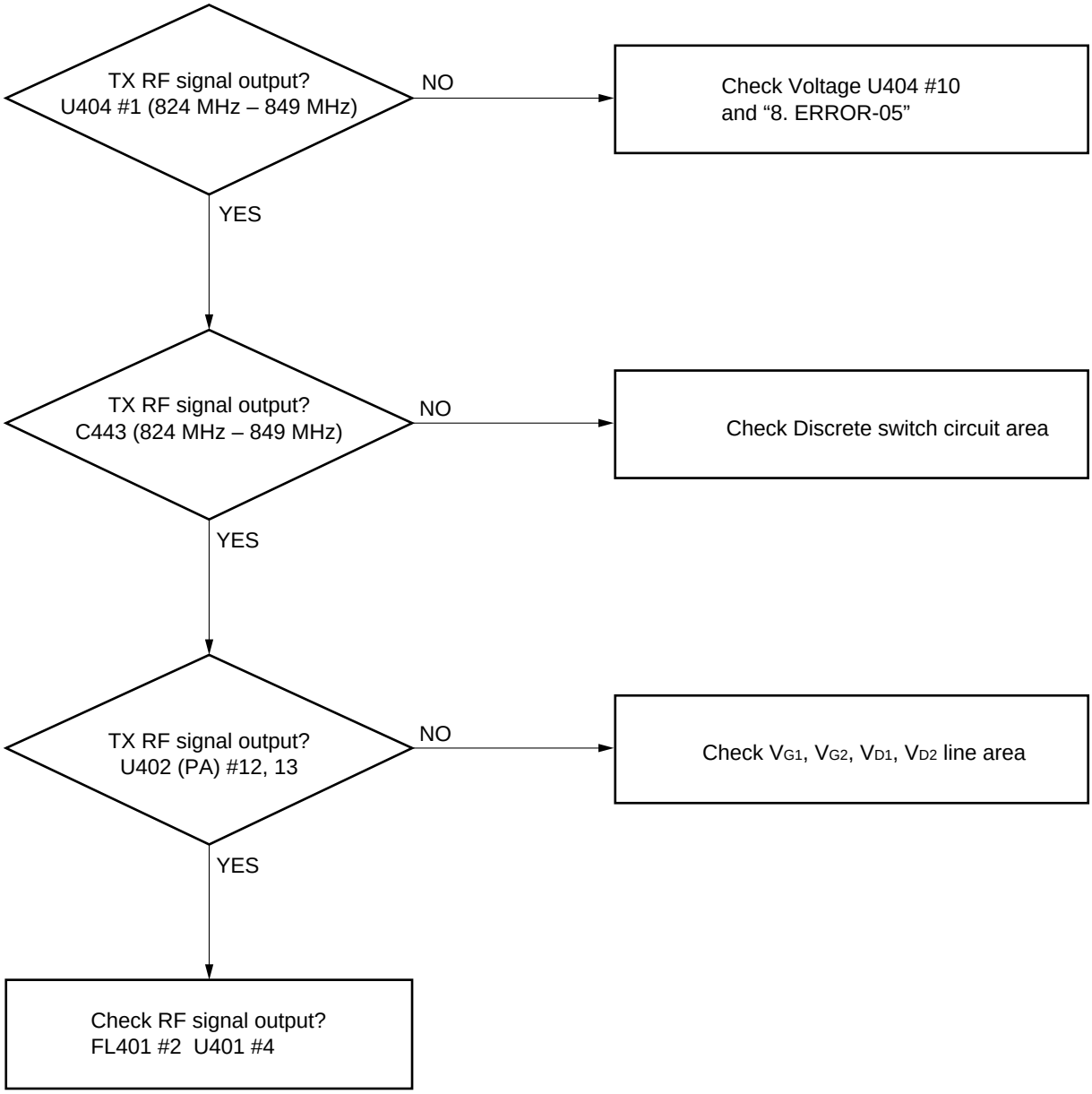
4-2. NO TX VOICE



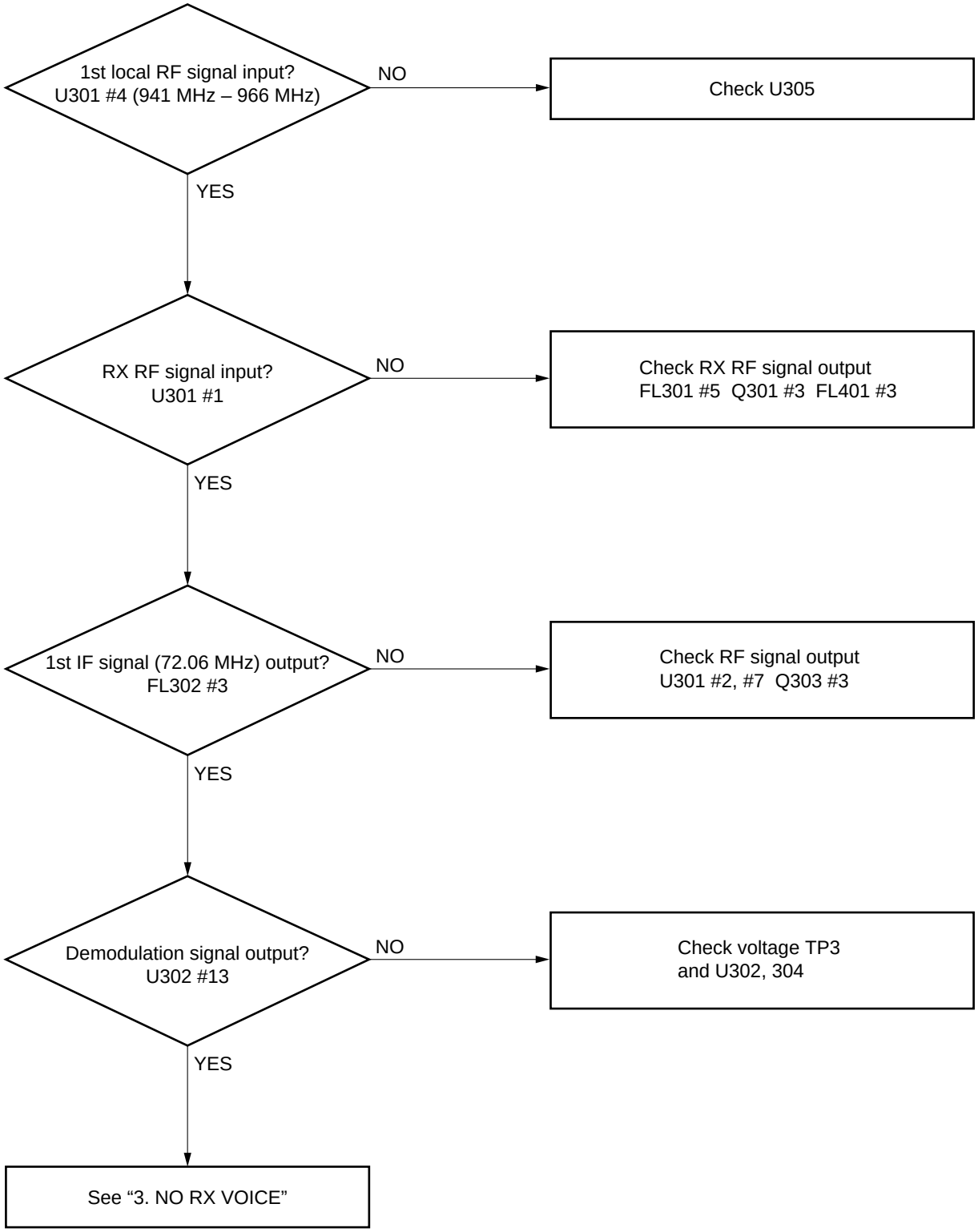
4-3. NO RX VOICE



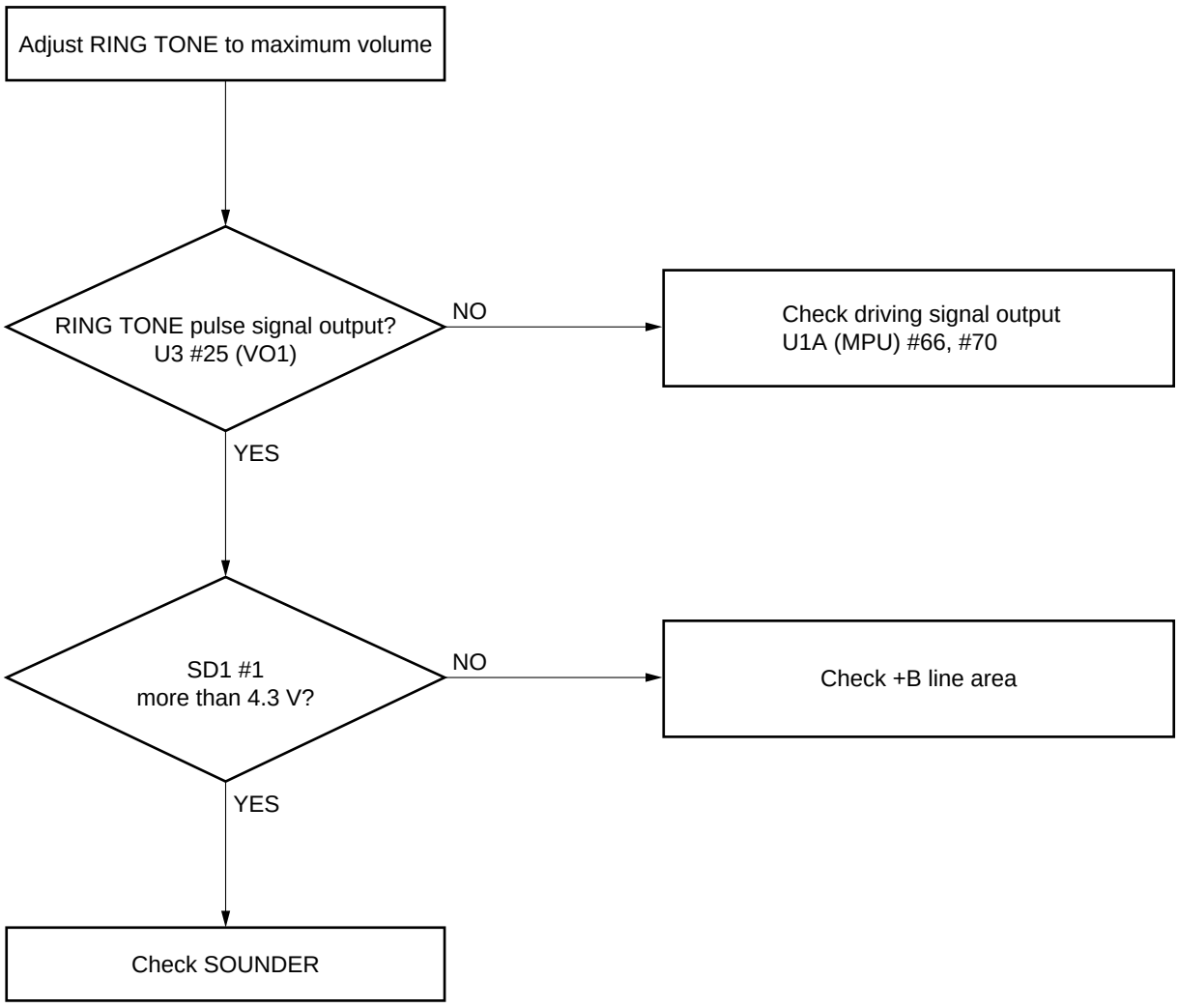
4-4. NO TX POWER



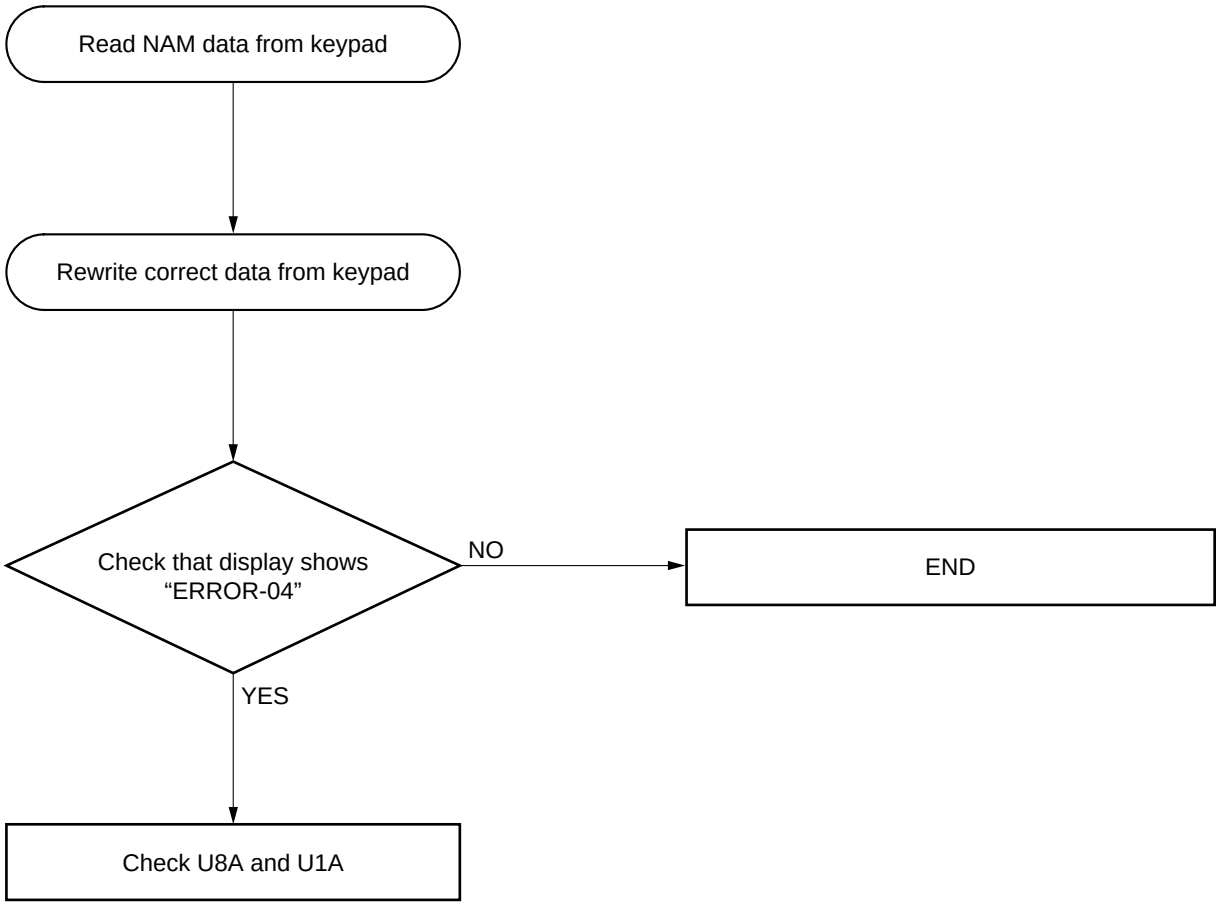
4-5. Poor RX SENSITIVITY



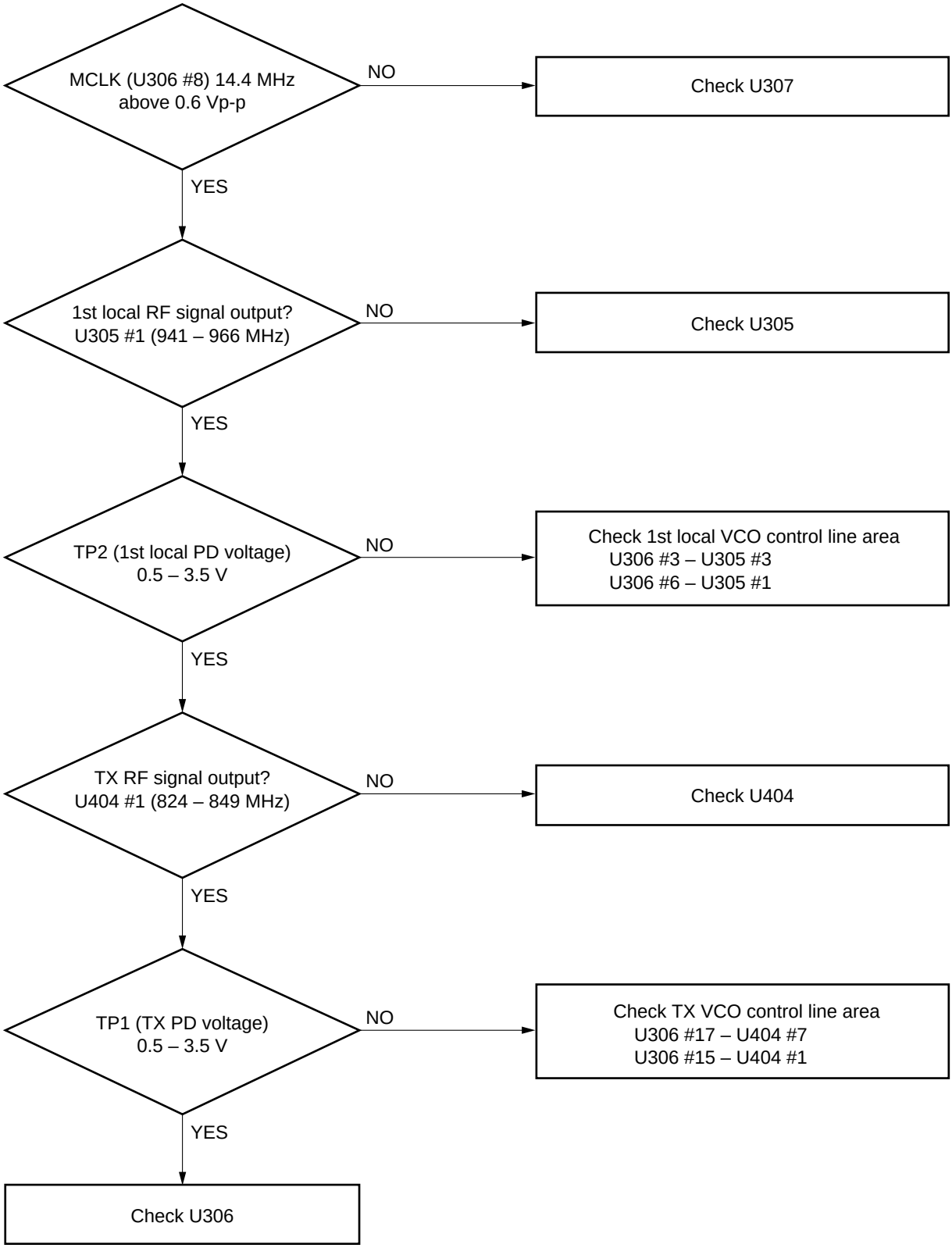
4-6. DO NOT RINGING



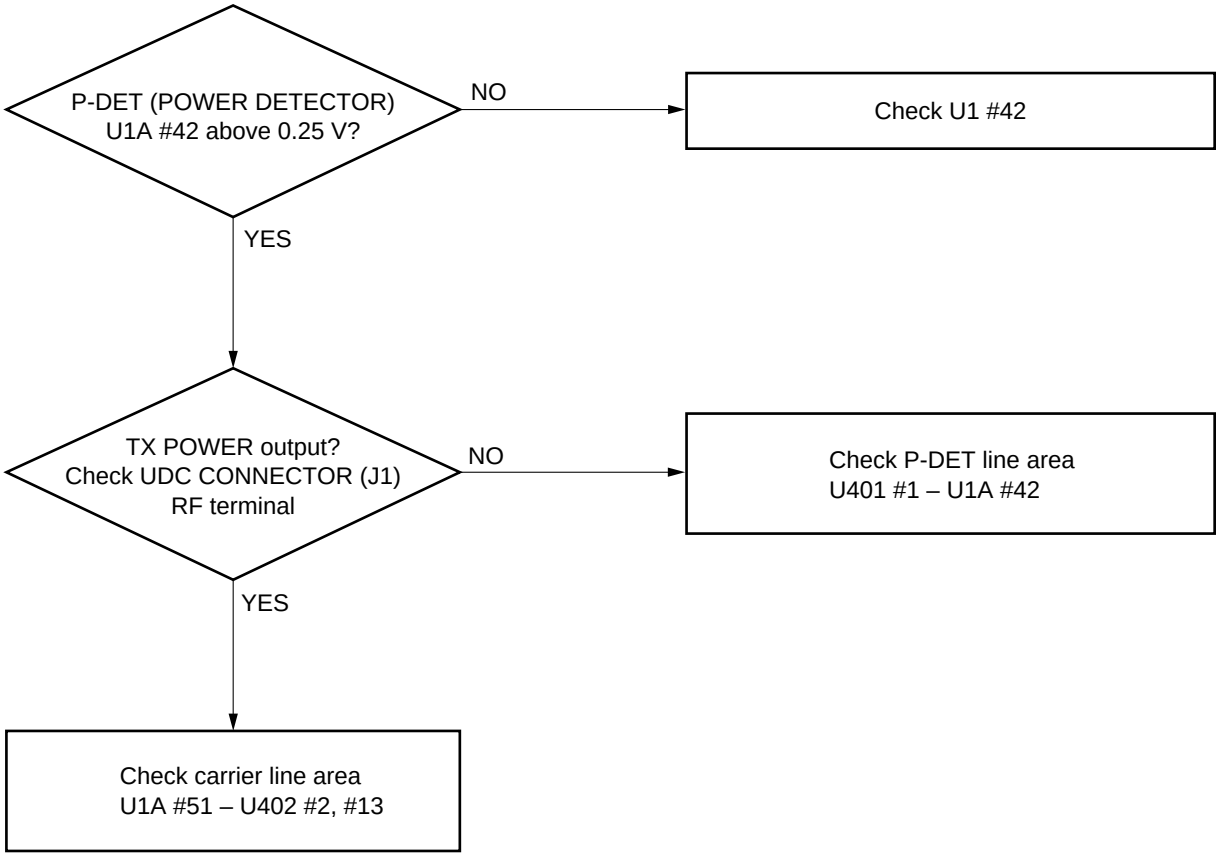
4-7. ERROR-04 (NAM data error)



4-8. ERROR-05 (Synthesizer unlock)

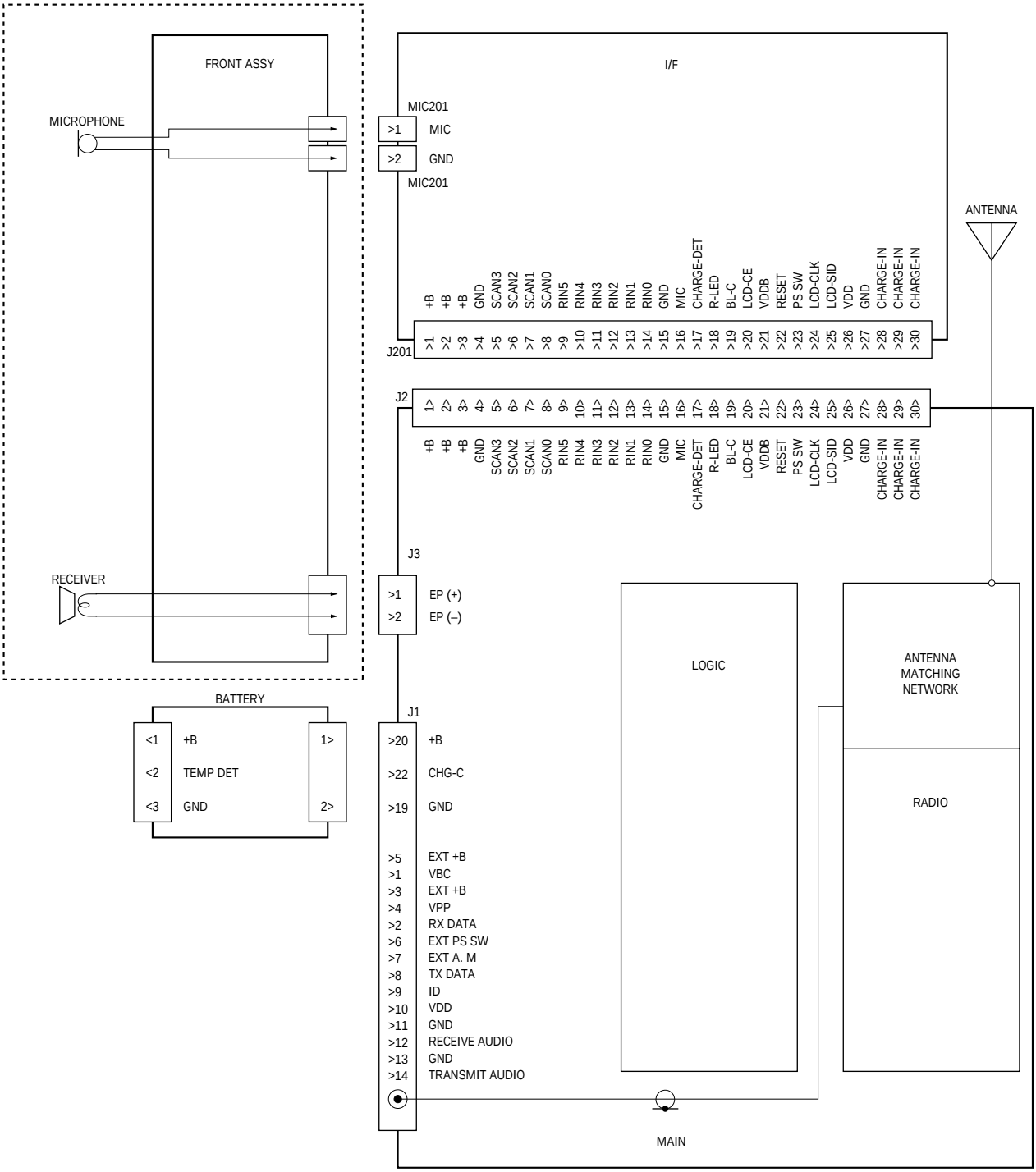


4-9. ERROR-06 (Abnomal RF power output)



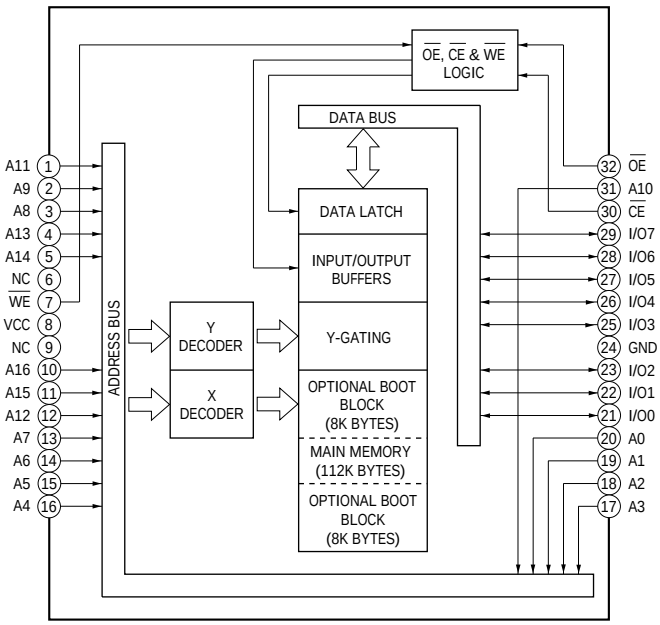
SECTION 5
DIAGRAMS

5-1. FRAME SCHEMATIC DIAGRAM

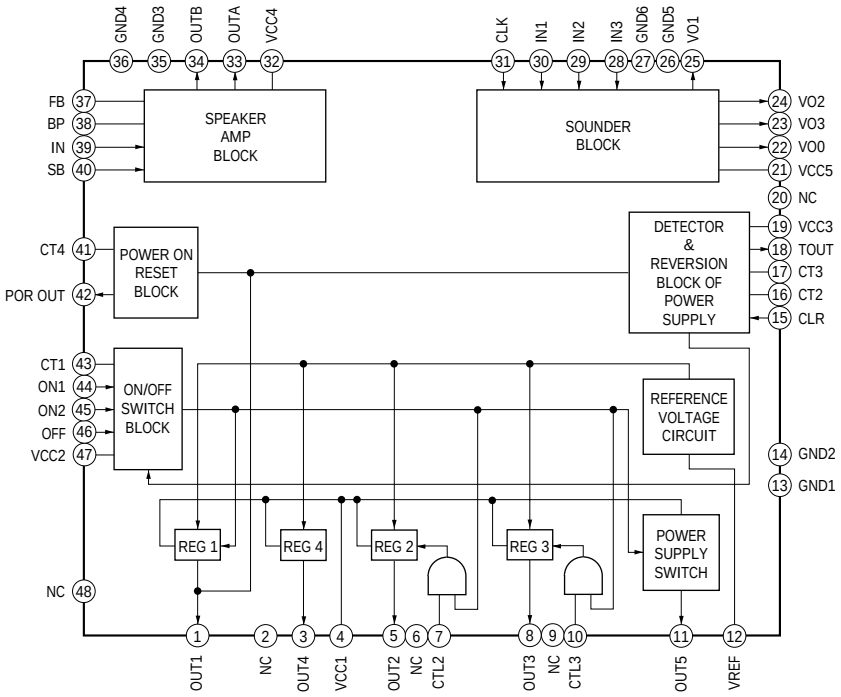

FRONT ASSY
MICROPHONE
RECEIVER
BATTERY
<1 +B
<2 TEMP DET
<3 GND
1>
2>
I/F
MIC201
>1 MIC
>2 GND
MIC201
ANTENNA
+B +B +B GND SCAN3 SCAN2 SCAN1 SCAN0 RIN5 RIN4 RIN3 RIN2 RIN1 RIN0 GND MIC CHARGE-DET R-LED BL-C LCD-CE VDDB RESET PS SW LCD-CLK LCD-SID VDD GND CHARGE-IN CHARGE-IN CHARGE-IN
J201
>1 >2 >3 >4 >5 >6 >7 >8 >9 >10 >11 >12 >13 >14 >15 >16 >17 >18 >19 >20 >21 >22 >23 >24 >25 >26 >27 >28 >29 >30
J2
1> 2> 3> 4> 5> 6> 7> 8> 9> 10> 11> 12> 13> 14> 15> 16> 17> 18> 19> 20> 21> 22> 23> 24> 25> 26> 27> 28> 29> 30>
+B +B +B GND SCAN3 SCAN2 SCAN1 SCAN0 RIN5 RIN4 RIN3 RIN2 RIN1 RIN0 GND MIC CHARGE-DET R-LED BL-C LCD-CE VDDB RESET PS SW LCD-CLK LCD-SID VDD GND CHARGE-IN CHARGE-IN CHARGE-IN
J3
>1 EP (+)
>2 EP (–)
J1
>20 +B
>22 CHG-C
>19 GND
>5 EXT +B
>1 VBC
>3 EXT +B
>4 VPP
>2 RX DATA
>6 EXT PS SW
>7 EXT A. M
>8 TX DATA
>9 ID
>10 VDD
>11 GND
>12 RECEIVE AUDIO
>13 GND
>14 TRANSMIT AUDIO
LOGIC
ANTENNA MATCHING NETWORK
RADIO
MAIN

• IC Block Diagrams – RAGIC Board –

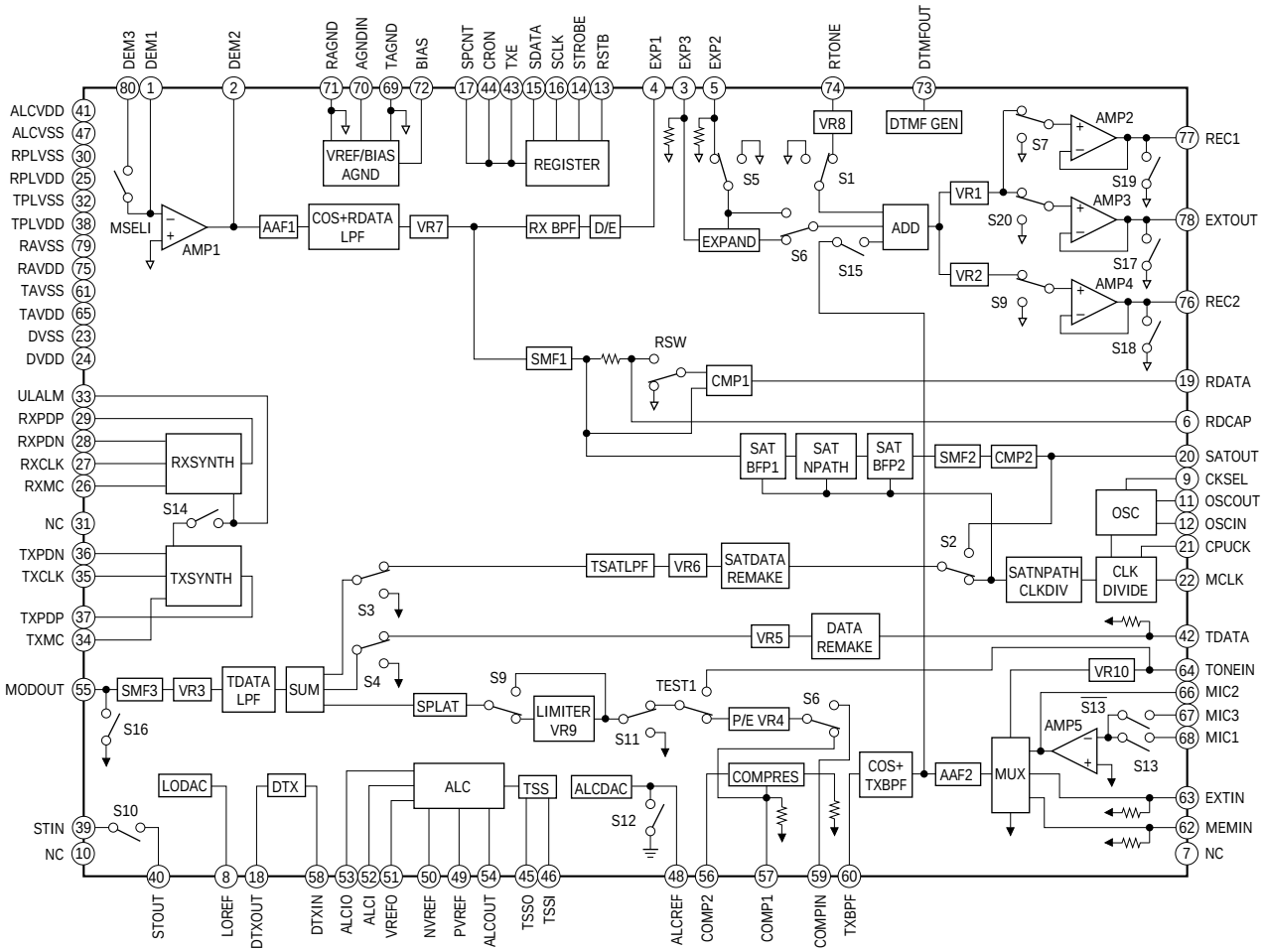
U2 AT29LV010A-15TC1



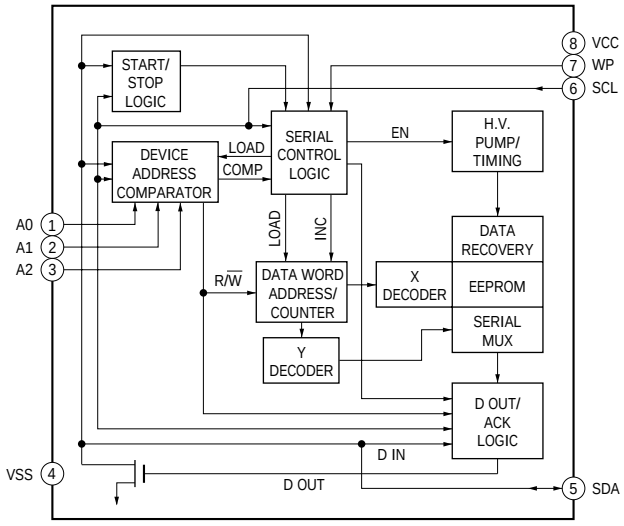
U3 MB3805APFV-G-BND



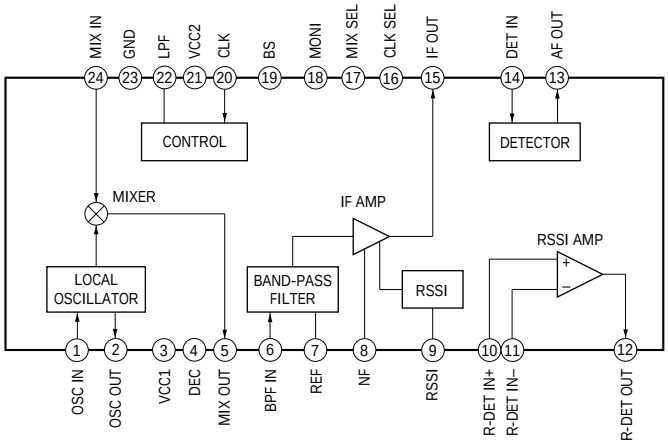
U5 AK2334



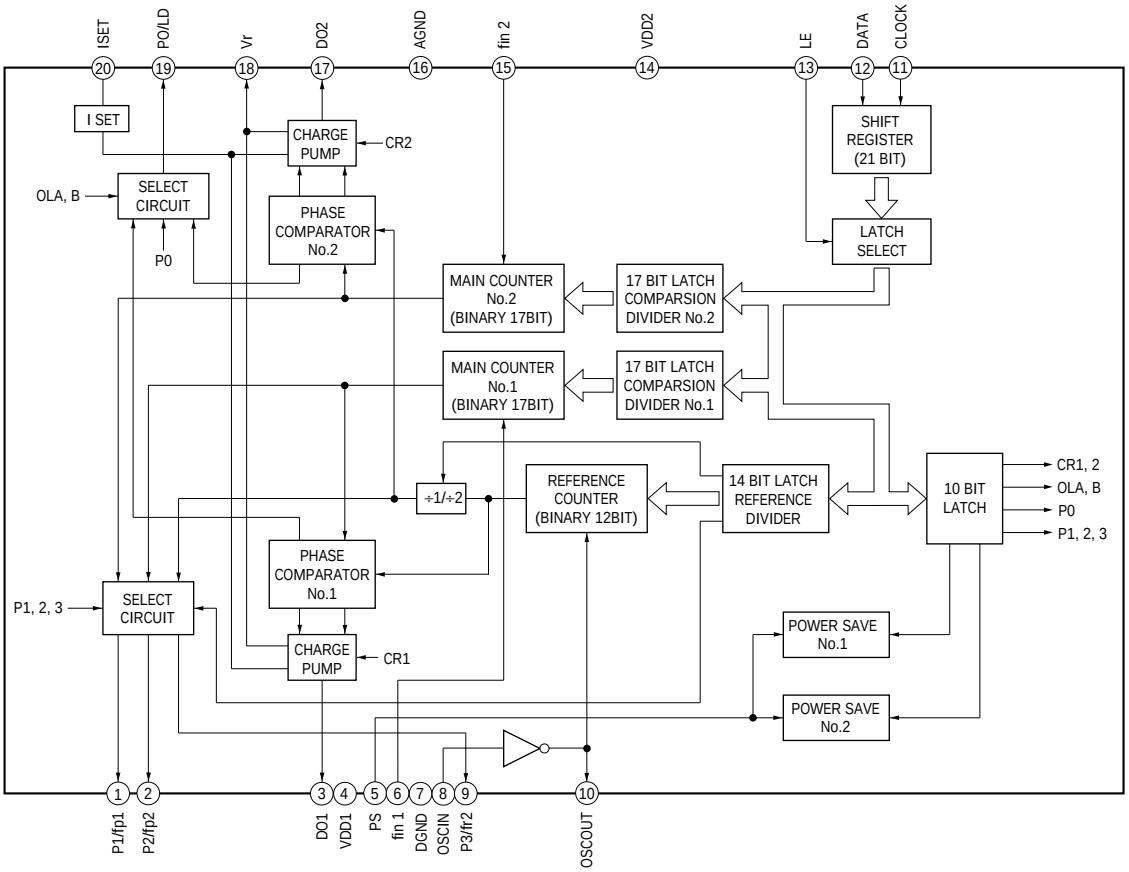
U8A AT24C32N-10SI-2.7



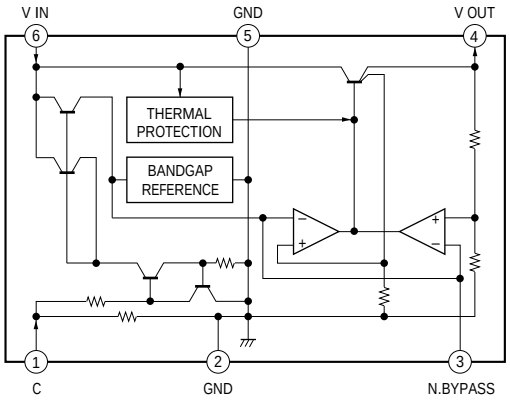
U302 TA31181FN



U306 MB15U10PFV-G-BND



U405 TK11240BMCL



5-2. NOTE FOR PRINTED WIRING BOARDS AND SCHEMATIC DIAGRAMS

Note on Schematic Diagram:

- All capacitors are in µF unless otherwise noted. pF: µµF 50 WV or less are not indicated except for electrolytics and tantalums.
- All resistors are in Ω and 1/4 W or less unless otherwise specified.
- B + : B+ Line.
- Power voltage is dc 5.8 V and fed with regulated dc power supply to 3 (EXT +B) pin of the jack connector (J1).
- Voltages are dc with respect to ground in TEST mode.
- Voltages are taken with a VOM (Input impedance 10 MΩ). Voltages variations may be noted due to normal production tolerances.
- Waveforms are taken with a oscilloscope. Voltage variations may be noted due to normal production tolerances.
- Circled numbers refer to waveforms.
- Signal path.
  ▷ : RX
  ▶ : TX

Note on Printed Wiring Boards:

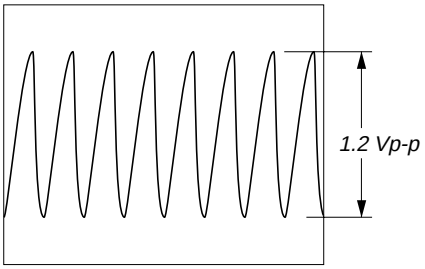
- o——— : parts extracted from the component side.
- ▒▒▒ : Pattern from the side which enables seeing.

(The other layers' patterns are not indicated.)

Caution:	
Pattern face side: (Conductor Side)	Parts on the pattern face side seen from the pattern face are indicated.
Parts face side: (Component Side)	Parts on the parts face side seen from the parts face are indicated.

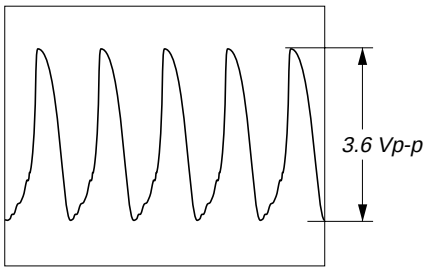
• Waveforms

❶ U307 ③ (O/P)



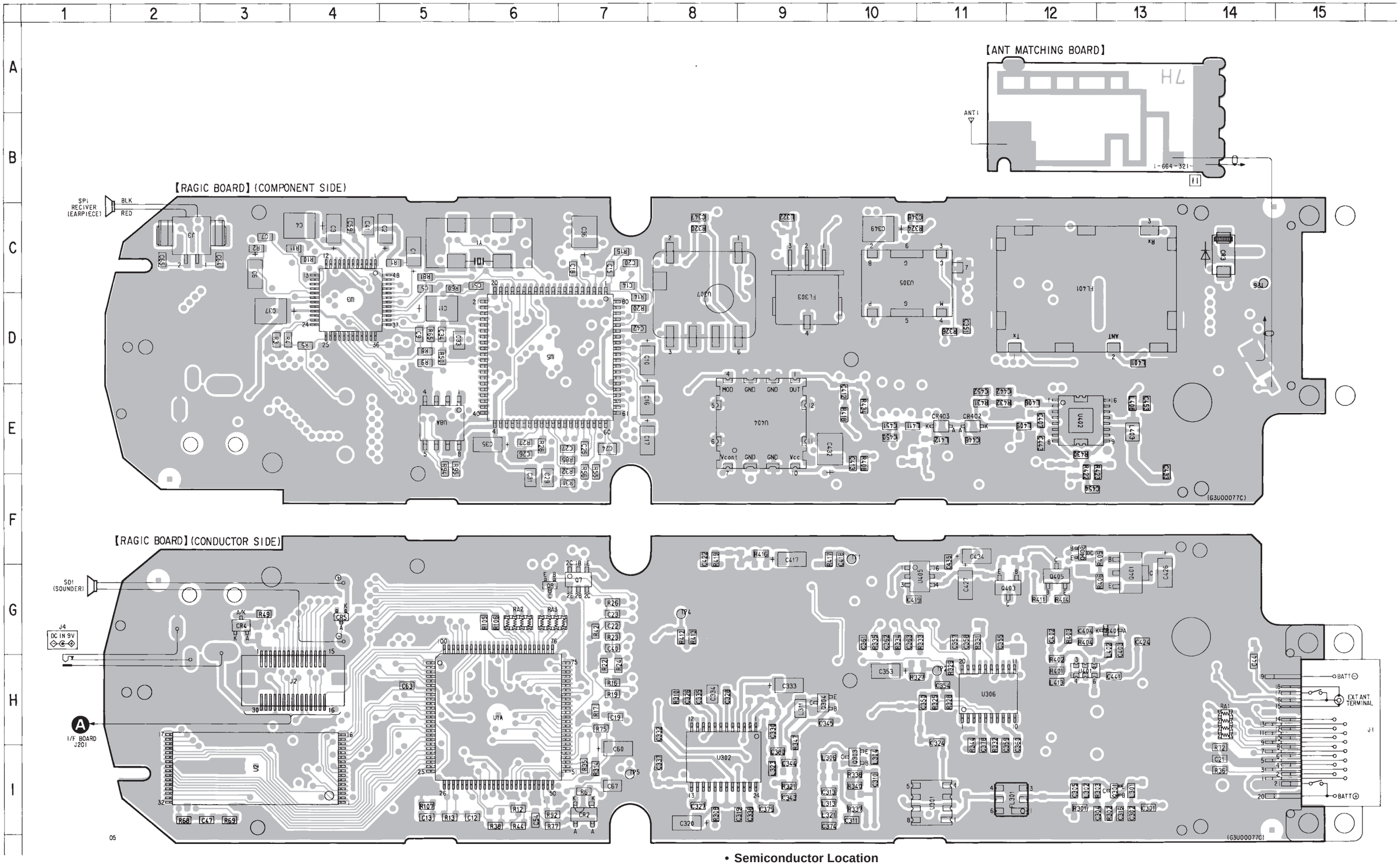
14.4 MHz

❷ U1A ㉘ (X2)



7.68 MHz

5-2. PRINTED WIRING BOARD – RF/LOGIC Section –



Note:

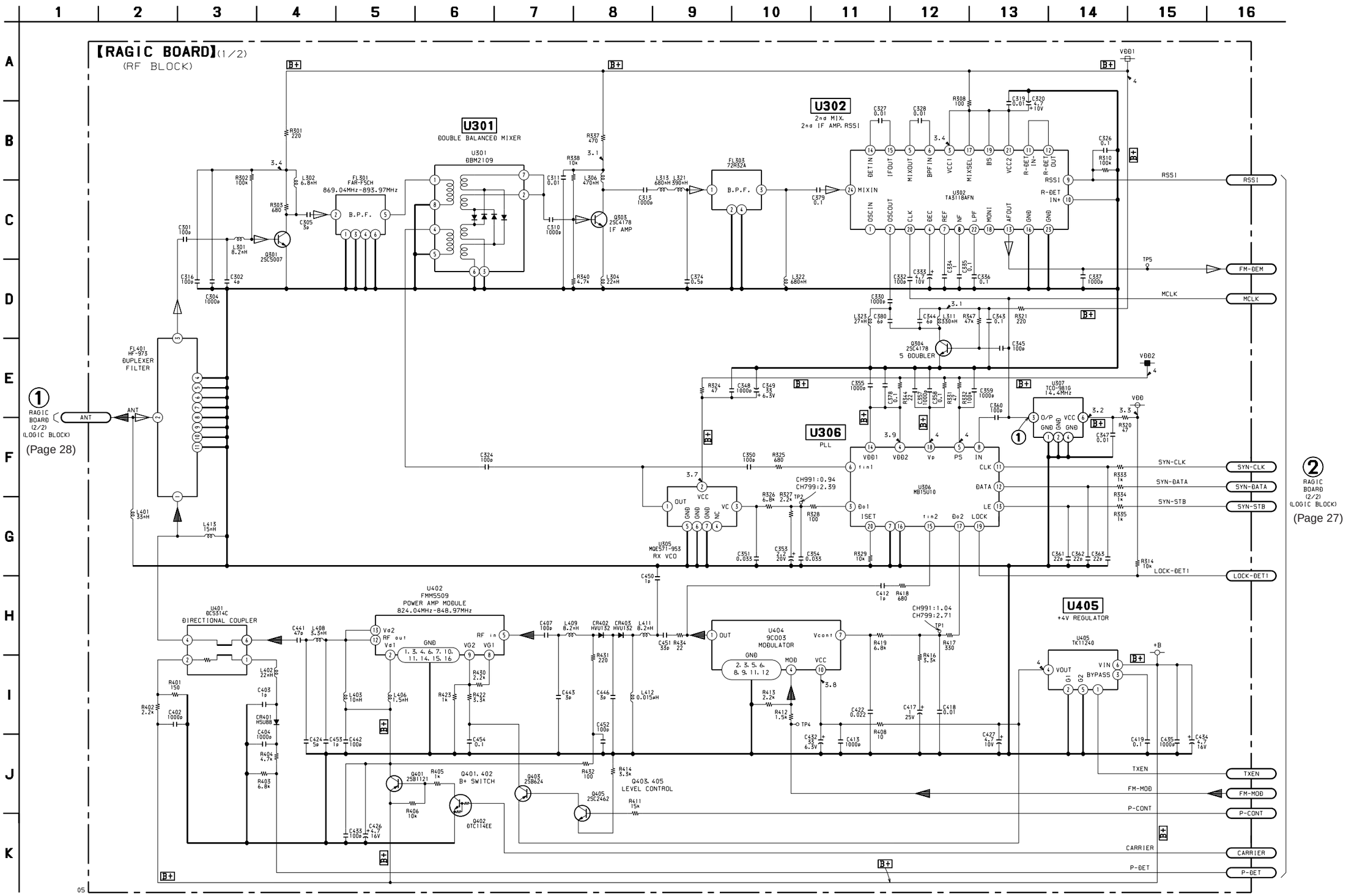
- This board is four-layer printed board.
  However, the patterns of layers 2 and 3 have not been included in the diagram.

- **Semiconductor Location**

Ref. No.	Location	Ref. No.	Location	Ref. No.	Location
CR2	I-7	Q7	G-7	U1A	H-6
CR3	C-14	Q8	G-6	U2	I-3
CR4	G-3	Q301	I-13	U3	D-4
CR5	G-4	Q303	I-10	U5	D-6
CR401	G-13	Q304	H-9	U8A	E-5
CR402	E-11	Q401	G-13	U301	I-11
CR403	E-11	Q402	F-12	U302	I-8
		Q403	G-11	U306	H-11
		Q405	G-12	U405	G-11

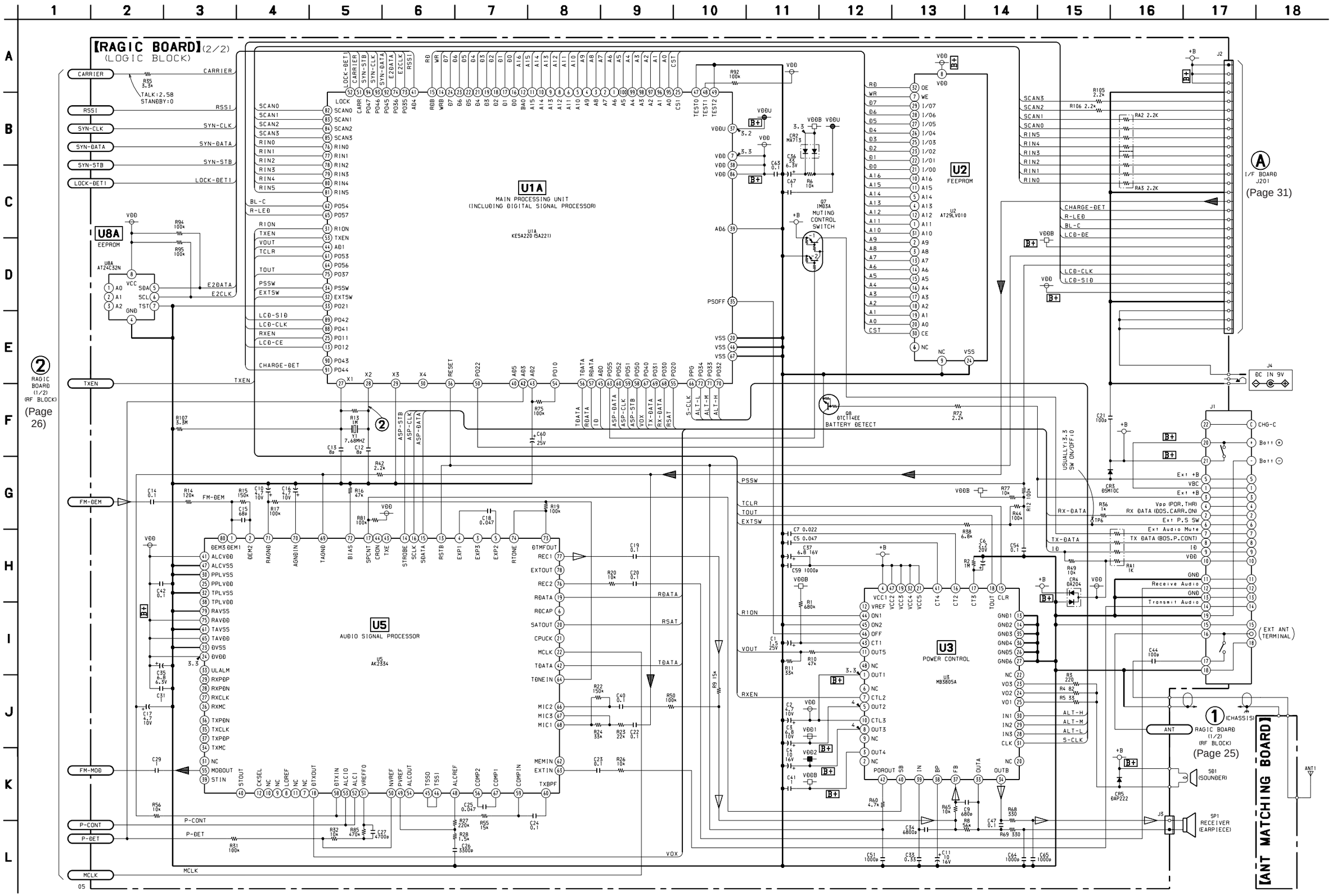
5-3. SCHEMATIC DIAGRAM – RAGIC Board (1/2) (RF Section) –

• See page 22 for Waveforms. • See page 20 and 21 for IC Block Diagrams.

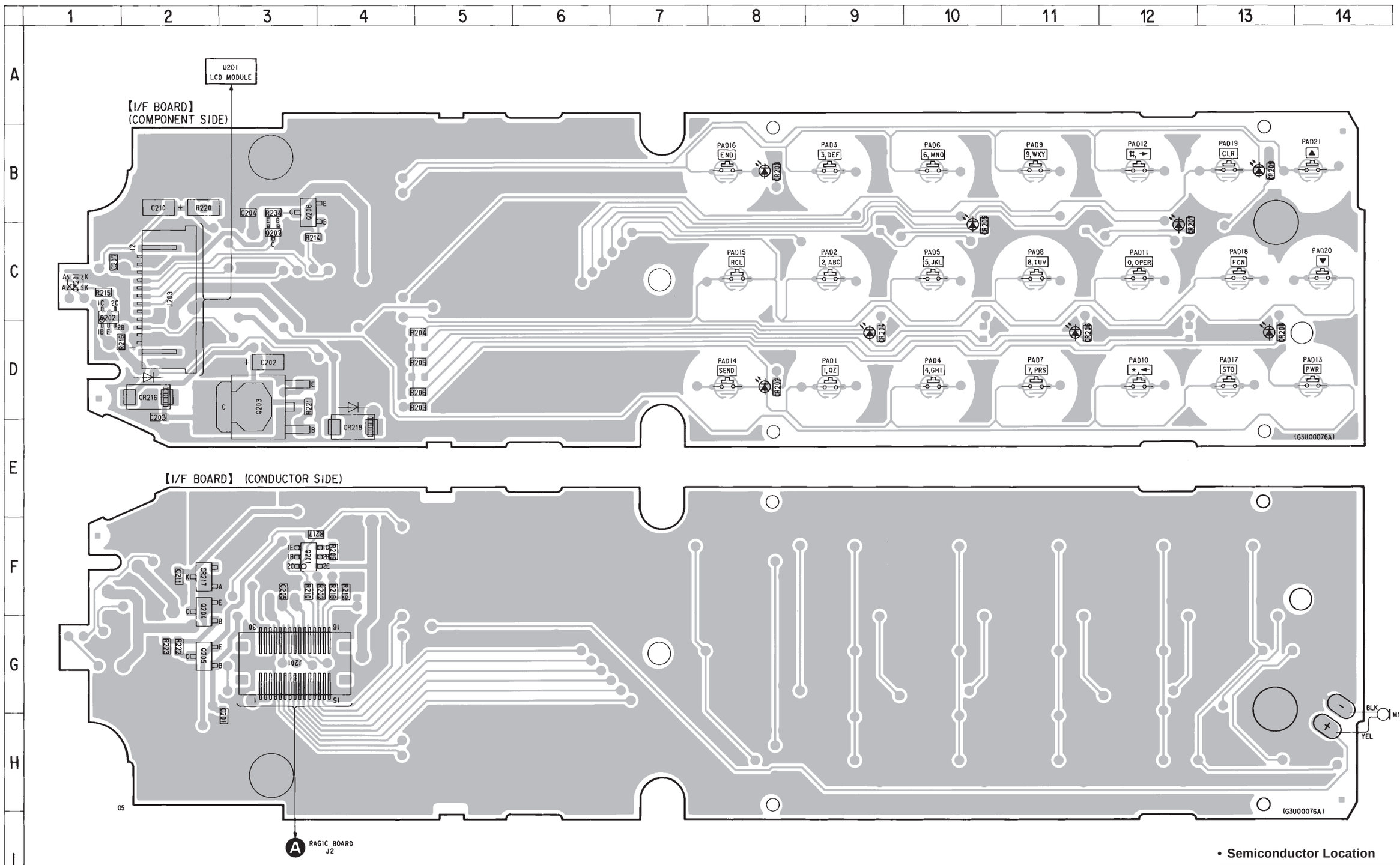


5-4. SCHEMATIC DIAGRAM – RAGIC Board (2/2) (LOGIC Section) –

• See page 22 for Waveforms. • See page 19 and 20 for IC Block Diagrams.



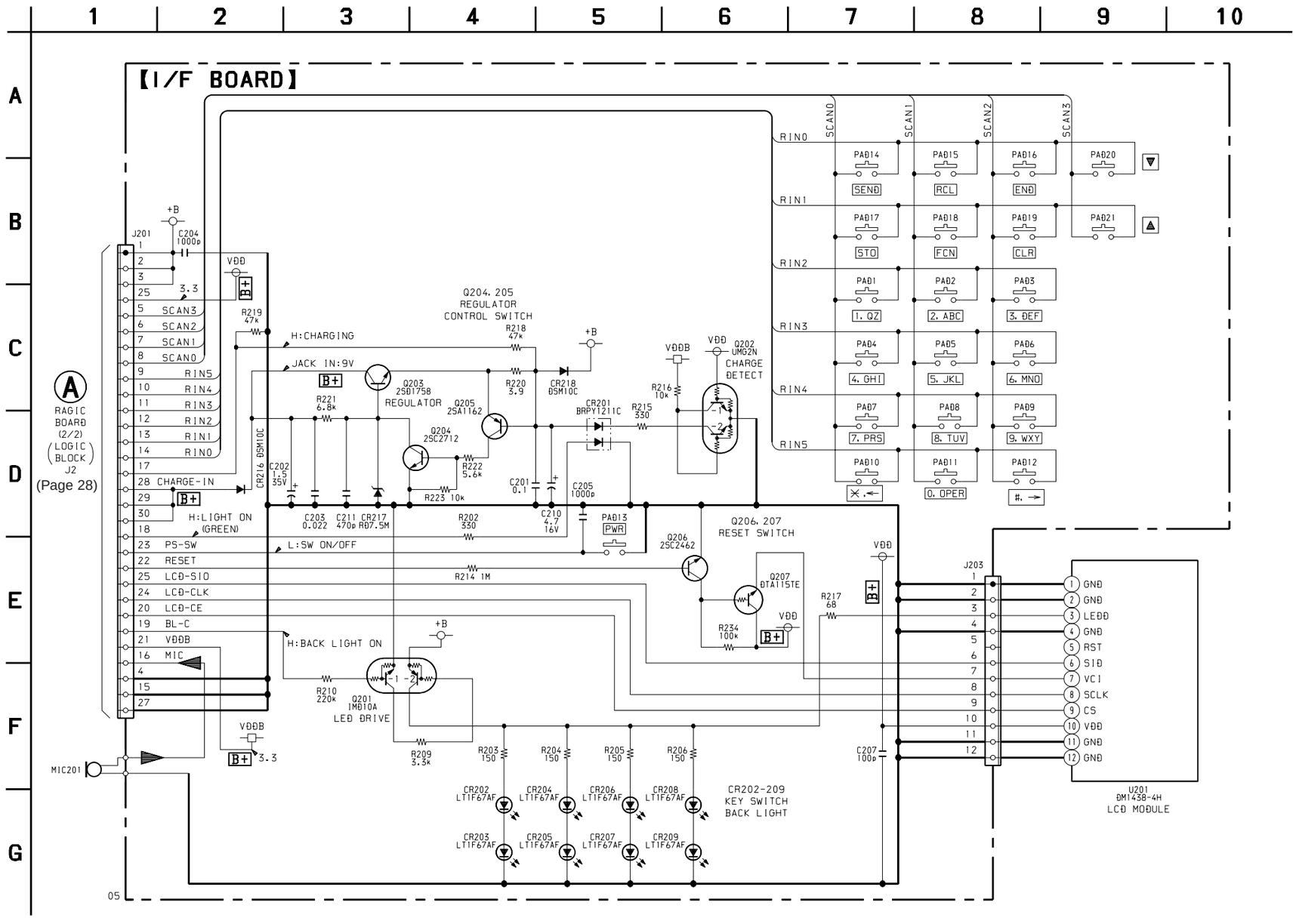
5-5. PRINTED WIRING BOARD – I/F Section –



• **Semiconductor Location**

Ref. No.	Location	Ref. No.	Location
CR201	C-1	CR217	F-2
CR202	D-8	CR218	E-4
CR203	B-8		
CR204	D-9	Q201	F-3
CR205	C-10	Q202	C-1
CR206	D-11	Q203	D-3
CR207	C-12	Q204	F-2
CR208	D-13	Q205	G-2
CR209	B-13	Q206	B-3
CR216	D-2	Q207	C-3

5-6. SCHEMATIC DIAGRAM – I/F Section –



SECTION 7
ELECTRICAL PARTS LIST

I/F RAGIC

RAGIC

NOTE:

- Due to standardization, replacements in the parts list may be different from the parts specified in the diagrams or the components used on the set.
- -XX and -X mean standardized parts, so they may have some difference from the original one.
- RESISTORS
  All resistors are in ohms.
  METAL: Metal-film resistor.
  METAL OXIDE: Metal oxide-film resistor.
  F: nonflammable
- Items marked "*" are not stocked since they are seldom required for routine service.
  Some delay should be anticipated when ordering these items.
- SEMICONDUCTORS
  In each case, u: µ, for example:
  uA. . : µA. . uPA. . : µPA. .
  uPB. . : µPB. . uPC. . : µPC. .
  uPD. . : µPD. .
- CAPACITORS
  uF: µF
- COILS
  uH: µH

When indicating parts by reference number, please include the board.

Ref. No.	Part No.	Description			Remark
*	A-3672-431-A	I/F BOARD, COMPLETE			
		**********			
	3-009-054-01	BOARD, LIGHTING			
		< CAPACITOR >			
C201	1-107-826-11	CERAMIC CHIP	0.1uF	10%	16V
C202	1-113-984-11	TANTALUM CHIP	1.5uF	20%	35V
C203	1-125-779-81	CERAMIC CHIP	0.022uF	5%	25V
C204	1-162-964-11	CERAMIC CHIP	0.001uF	10%	50V
C205	1-162-964-11	CERAMIC CHIP	0.001uF	10%	50V
C207	1-162-927-11	CERAMIC CHIP	100PF	5%	50V
C210	1-107-686-11	TANTALUM CHIP	4.7uF	20%	16V
C211	1-164-315-11	CERAMIC CHIP	470PF	5%	50V
		< DIODE >			
CR201	8-719-064-16	DIODE BRPY1211C-TR			
CR202	8-719-064-15	LED LT1F67AF			
CR203	8-719-064-15	LED LT1F67AF			
CR204	8-719-064-15	LED LT1F67AF			
CR205	8-719-064-15	LED LT1F67AF			
CR206	8-719-064-15	LED LT1F67AF			
CR207	8-719-064-15	LED LT1F67AF			
CR208	8-719-064-15	LED LT1F67AF			
CR209	8-719-064-15	LED LT1F67AF			
CR216	8-719-031-18	DIODE DSM10C-TR			
CR217	8-719-106-24	DIODE RD7.5M-T1B3			
CR218	8-719-031-18	DIODE DSM10C-TR			
		< CONNECTOR >			
J201	1-778-136-11	CONNECTOR (24 5087 030 001 829)			
J203	1-779-505-11	CONNECTOR (SFR12R-1STE1)			
		< MICROPHONE >			
MIC201	1-542-308-11	MICROPHONE			
		< TRANSISTOR >			
Q201	8-729-040-14	TRANSISTOR IMD10A-T108			
Q202	8-729-927-74	TRANSISTOR UMG2			
Q203	8-729-922-34	TRANSISTOR 2SD1758F5-QR			
Q204	8-729-230-49	TRANSISTOR 2SC2712-YG			
Q205	8-729-230-46	TRANSISTOR 2SA1162-YG-TE85R			
Q206	8-729-031-45	TRANSISTOR 2SC2462-LC-TL			
Q207	8-729-041-40	TRANSISTOR DTA115TE-TL			
		< RESISTOR >			
R202	1-216-815-11	METAL CHIP	330	5%	1/16W
R203	1-216-811-11	METAL CHIP	150	5%	1/16W
R204	1-216-811-11	METAL CHIP	150	5%	1/16W
R205	1-216-811-11	METAL CHIP	150	5%	1/16W
R206	1-216-811-11	METAL CHIP	150	5%	1/16W
R209	1-216-827-11	METAL CHIP	3.3K	5%	1/16W
R210	1-216-849-11	METAL CHIP	220K	5%	1/16W
R214	1-216-857-11	METAL CHIP	1M	5%	1/16W
R215	1-216-815-11	METAL CHIP	330	5%	1/16W
R216	1-216-833-11	METAL CHIP	10K	5%	1/16W
R217	1-216-807-11	METAL CHIP	68	5%	1/16W
R218	1-216-841-11	METAL CHIP	47K	5%	1/16W
R219	1-216-841-11	METAL CHIP	47K	5%	1/16W
R220	1-216-140-00	RES, CHIP	3.9	5%	1/8W
R221	1-216-831-11	METAL CHIP	6.8K	5%	1/16W
R222	1-216-830-11	METAL CHIP	5.6K	5%	1/16W
R223	1-216-833-11	METAL CHIP	10K	5%	1/16W
R234	1-216-845-11	METAL CHIP	100K	5%	1/16W
		< LCD MODULE >			
U201	1-801-583-11	LCD MODULE			
**********					
*	A-3672-432-A	RAGIC BOARD, COMPLETE			
		**********			
	3-009-055-01	CASE (A), SHIELD			
	3-009-064-01	CASE (B), SHIELD			
	3-009-278-01	SCREW (1.4X4)			
	3-009-279-01	SCREW (2X4)			
	3-013-366-01	SPRING, LEAF			
	3-933-455-01	SCREW (SHIELD), FITTING			
		< CAPACITOR >			
C1	1-107-688-11	TANTALUM CHIP	1.5uF	20%	25V
C2	1-135-210-11	TANTALUM CHIP	4.7uF	20%	10V
C3	1-104-850-11	TANTALUM CHIP	6.8uF	20%	10V
C4	1-104-913-11	TANTALUM CHIP	10uF	20%	16V
C5	1-165-176-11	CERAMIC CHIP	0.047uF	10%	16V
C6	1-104-915-11	TANTALUM CHIP	2.2uF	20%	20V
C7	1-164-227-11	CERAMIC CHIP	0.022uF	10%	25V
C9	1-115-412-11	CERAMIC CHIP	680PF	5%	25V
C10	1-135-210-11	TANTALUM CHIP	4.7uF	20%	10V
C11	1-104-913-11	TANTALUM CHIP	10uF	20%	16V
C12	1-162-913-11	CERAMIC CHIP	8PF	0.5PF	50V
C13	1-162-913-11	CERAMIC CHIP	8PF	0.5PF	50V
C14	1-107-826-11	CERAMIC CHIP	0.1uF	10%	16V
C15	1-162-925-11	CERAMIC CHIP	68PF	5%	50V
C16	1-135-210-11	TANTALUM CHIP	4.7uF	20%	10V
C17	1-135-210-11	TANTALUM CHIP	4.7uF	20%	10V
C18	1-165-176-11	CERAMIC CHIP	0.047uF	10%	16V
C19	1-107-826-11	CERAMIC CHIP	0.1uF	10%	16V
C20	1-107-826-11	CERAMIC CHIP	0.1uF	10%	16V
C21	1-162-927-11	CERAMIC CHIP	100PF	5%	50V
C22	1-107-826-11	CERAMIC CHIP	0.1uF	10%	16V
C23	1-107-826-11	CERAMIC CHIP	0.1uF	10%	16V
C24	1-164-004-11	CERAMIC CHIP	0.1uF	10%	25V
C25	1-165-176-11	CERAMIC CHIP	0.047uF	10%	16V
C26	1-162-967-11	CERAMIC CHIP	0.0033uF	10%	50V
C27	1-162-968-11	CERAMIC CHIP	0.0047uF	10%	50V
C29	1-164-346-11	CERAMIC CHIP	1uF		16V
C31	1-164-346-11	CERAMIC CHIP	1uF		16V
C33	1-110-501-11	CERAMIC CHIP	0.33uF	10%	16V
C34	1-162-969-11	CERAMIC CHIP	0.0068uF	10%	25V
C35	1-135-211-11	TANTALUM CHIP	6.8uF	20%	6.3V
C36	1-104-752-11	TANTALUM CHIP	33uF	20%	6.3V
C37	1-135-215-21	TANTALUM CHIP	6.8uF	20%	16V
C40	1-107-826-11	CERAMIC CHIP	0.1uF	10%	16V
C41	1-164-346-11	CERAMIC CHIP	1uF		16V
C42	1-107-826-11	CERAMIC CHIP	0.1uF	10%	16V
C44	1-162-927-11	CERAMIC CHIP	100PF	5%	50V
C47	1-107-826-11	CERAMIC CHIP	0.1uF	10%	16V
C51	1-162-964-11	CERAMIC CHIP	0.001uF	10%	50V
C54	1-107-826-11	CERAMIC CHIP	0.1uF	10%	16V
C59	1-162-964-11	CERAMIC CHIP	0.001uF	10%	50V
C60	1-135-177-21	TANTALUM CHIP	1uF	20%	20V
C63	1-107-826-11	CERAMIC CHIP	0.1uF	10%	16V
C64	1-162-964-11	CERAMIC CHIP	0.001uF	10%	50V
C65	1-162-964-11	CERAMIC CHIP	0.001uF	10%	50V
C67	1-164-346-11	CERAMIC CHIP	1uF		16V
C301	1-162-927-11	CERAMIC CHIP	100PF	5%	50V
C302	1-162-909-11	CERAMIC CHIP	4PF	0.25PF	50V
C304	1-162-964-11	CERAMIC CHIP	0.001uF	10%	50V
C305	1-162-908-11	CERAMIC CHIP	3PF	0.25PF	50V
C310	1-162-964-11	CERAMIC CHIP	0.001uF	10%	50V
C311	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V
C313	1-162-964-11	CERAMIC CHIP	0.001uF	10%	50V
C316	1-162-927-11	CERAMIC CHIP	100PF	5%	50V
C319	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V
C320	1-135-210-11	TANTALUM CHIP	4.7uF	20%	10V
C324	1-162-927-11	CERAMIC CHIP	100PF	5%	50V
C326	1-107-826-11	CERAMIC CHIP	0.1uF	10%	16V
C327	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V
C328	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V
C330	1-162-964-11	CERAMIC CHIP	0.001uF	10%	50V
C332	1-162-927-11	CERAMIC CHIP	100PF	5%	50V
C333	1-135-210-11	TANTALUM CHIP	4.7uF	20%	10V
C334	1-164-346-11	CERAMIC CHIP	1uF		16V
C335	1-107-826-11	CERAMIC CHIP	0.1uF	10%	16V
C336	1-107-826-11	CERAMIC CHIP	0.1uF	10%	16V
C337	1-162-964-11	CERAMIC CHIP	0.001uF	10%	50V
C343	1-107-826-11	CERAMIC CHIP	0.1uF	10%	16V
C344	1-162-911-11	CERAMIC CHIP	6PF	0.5PF	50V
C345	1-162-927-11	CERAMIC CHIP	100PF	5%	50V
C347	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V
C348	1-162-964-11	CERAMIC CHIP	0.001uF	10%	50V
C349	1-104-752-11	TANTALUM CHIP	33uF	20%	6.3V
C350	1-162-927-11	CERAMIC CHIP	100PF	5%	50V
C351	1-164-677-11	CERAMIC CHIP	0.033uF	10%	16V
C353	1-104-915-11	TANTALUM CHIP	2.2uF	20%	20V
C354	1-164-677-11	CERAMIC CHIP	0.033uF	10%	16V
C355	1-162-964-11	CERAMIC CHIP	0.001uF	10%	50V
C357	1-162-964-11	CERAMIC CHIP	0.001uF	10%	50V
C358	1-107-826-11	CERAMIC CHIP	0.1uF	10%	16V
C359	1-162-964-11	CERAMIC CHIP	0.001uF	10%	50V
C360	1-162-927-11	CERAMIC CHIP	100PF	5%	50V
C361	1-162-919-11	CERAMIC CHIP	22PF	5%	50V
C362	1-162-919-11	CERAMIC CHIP	22PF	5%	50V
C363	1-162-919-11	CERAMIC CHIP	22PF	5%	50V
C374	1-162-904-11	CERAMIC CHIP	0.5PF	0.25PF	50V
C378	1-107-826-11	CERAMIC CHIP	0.1uF	10%	16V
C379	1-107-826-11	CERAMIC CHIP	0.1uF	10%	16V
C380	1-162-911-11	CERAMIC CHIP	6PF	0.5PF	50V
C402	1-162-964-11	CERAMIC CHIP	0.001uF	10%	50V
C403	1-162-905-11	CERAMIC CHIP	1PF	0.25PF	50V
C404	1-162-964-11	CERAMIC CHIP	0.001uF	10%	50V
C407	1-162-927-11	CERAMIC CHIP	100PF	5%	50V
C412	1-162-905-11	CERAMIC CHIP	1PF	0.25PF	50V
C413	1-162-964-11	CERAMIC CHIP	0.001uF	10%	50V
C417	1-135-177-21	TANTALUM CHIP	1uF	20%	20V
C418	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V
C419	1-107-826-11	CERAMIC CHIP	0.1uF	10%	16V
C422	1-125-779-81	CERAMIC CHIP	0.022uF	5%	25V
C424	1-162-911-11	CERAMIC CHIP	6PF	0.5PF	50V
C426	1-107-686-11	TANTALUM CHIP	4.7uF	20%	16V
C427	1-135-210-11	TANTALUM CHIP	4.7uF	20%	10V
C432	1-104-752-11	TANTALUM CHIP	33uF	20%	6.3V
C433	1-162-927-11	CERAMIC CHIP	100PF	5%	50V
C434	1-107-686-11	TANTALUM CHIP	4.7uF	20%	16V
C435	1-162-964-11	CERAMIC CHIP	0.001uF	10%	50V
C441	1-162-923-11	CERAMIC CHIP	47PF	5%	50V
C442	1-162-927-11	CERAMIC CHIP	100PF	5%	50V
C443	1-162-908-11	CERAMIC CHIP	3PF	0.25PF	50V
C446	1-162-908-11	CERAMIC CHIP	3PF	0.25PF	50V
C450	1-162-905-11	CERAMIC CHIP	1PF	0.25PF	50V
C451	1-162-921-11	CERAMIC CHIP	33PF	5%	50V
C452	1-162-927-11	CERAMIC CHIP	100PF	5%	50V
C453	1-162-905-11	CERAMIC CHIP	1PF	0.25PF	50V
C454	1-107-826-11	CERAMIC CHIP	0.1uF	10%	16V

Ref. No.	Part No.	Description	Remark
		< DIODE >	
CR2	8-719-404-16	DIODE MA713-TX	
CR3	8-719-031-18	DIODE DSM10C-TR	
CR4	8-719-941-23	DIODE DA204UT106	
CR5	8-719-991-00	DIODE DAP222-TL	
CR401	8-719-038-43	DIODE HSU88	
CR402	8-719-055-23	DIODE HVU132TRF	
CR403	8-719-055-23	DIODE HVU132TRF	
		< FILTER/ENCAPSULATED COMPONENT >	
FL301	1-767-504-11	FILTER (FAR-F5CH-881M50-S2A2-T)	
* FL303	1-767-764-11	FILTER, CRYSTAL (72R32A)	
* FL401	1-234-022-11	ENCAPSULATED COMPONENT(HF-973)	
		< CONNECTOR/JACK >	
J1	1-778-134-11	CONNECTOR, UDC (AXR91010402)	
J2	1-778-135-11	CONNECTOR (14 5087 030 025 829)	
J3	1-691-741-11	PIN, CONNECTOR (PC BOARD) 2P	
J4	1-569-966-11	JACKE, DC (DC IN 9V)	
		< COIL >	
L301	1-414-737-11	INDUCTOR 8.2NH	
L302	1-414-736-11	INDUCTOR 6.8NH	
L304	1-414-725-11	INDUCTOR 22NH	
L306	1-412-975-11	INDUCTOR CHIP 0.47uH	
* L311	1-469-105-11	INDUCTOR 0.33uH	
L313	1-412-977-11	INDUCTOR CHIP 0.68uH	
L321	1-412-974-11	INDUCTOR CHIP 0.39uH	
L322	1-412-977-11	INDUCTOR CHIP 0.68uH	
L323	1-414-726-21	INDUCTOR 27NH	
L401	1-414-727-11	INDUCTOR 33NH	
L402	1-414-725-11	INDUCTOR 22NH	
L403	1-414-679-11	INDUCTOR CHIP 10NH	
L406	1-414-715-21	INDUCTOR 1.5NH	
L408	1-414-719-21	INDUCTOR 3.3NH	
L409	1-414-737-11	INDUCTOR 8.2NH	
L411	1-414-737-11	INDUCTOR 8.2NH	
L412	1-414-723-11	INDUCTOR 15NH	
L413	1-414-723-11	INDUCTOR 15NH	
		< TRANSISTOR >	
Q7	8-729-907-28	TRANSISTOR IMD3	
Q8	8-729-928-90	TRANSISTOR DTC114EE	
Q301	8-729-031-44	TRANSISTOR 2SC5007-T1	
Q303	8-729-117-72	TRANSISTOR 2SC4178-F13	
Q304	8-729-117-72	TRANSISTOR 2SC4178-F13	
Q401	8-729-820-86	TRANSISTOR 2SB1121-ST	
Q402	8-729-928-90	TRANSISTOR DTC114EE	
Q403	8-729-141-48	TRANSISTOR 2SB624-BV345	
Q405	8-729-031-45	TRANSISTOR 2SC2462-LC-TL	
		< RESISTOR >	
R1	1-216-855-11	METAL CHIP 680K 5% 1/16W	
R2	1-216-857-11	METAL CHIP 1M 5% 1/16W	
R3	1-216-813-11	METAL CHIP 220 5% 1/16W	
R4	1-216-808-11	METAL CHIP 82 5% 1/16W	
R5	1-216-803-11	METAL CHIP 33 5% 1/16W	

Ref. No.	Part No.	Description	Remark
R6	1-216-833-11	METAL CHIP 10K 5% 1/16W	
R8	1-216-842-11	METAL CHIP 56K 5% 1/16W	
R9	1-216-835-11	METAL CHIP 15K 5% 1/16W	
R10	1-216-841-11	METAL CHIP 47K 5% 1/16W	
R11	1-216-839-11	METAL CHIP 33K 5% 1/16W	
R12	1-216-845-11	METAL CHIP 100K 5% 1/16W	
R13	1-216-857-11	METAL CHIP 1M 5% 1/16W	
R14	1-216-846-11	METAL CHIP 120K 5% 1/16W	
R15	1-216-847-11	METAL CHIP 150K 5% 1/16W	
R16	1-216-841-11	METAL CHIP 47K 5% 1/16W	
R17	1-216-845-11	METAL CHIP 100K 5% 1/16W	
R19	1-216-845-11	METAL CHIP 100K 5% 1/16W	
R20	1-216-833-11	METAL CHIP 10K 5% 1/16W	
R22	1-216-847-11	METAL CHIP 150K 5% 1/16W	
R23	1-216-837-11	METAL CHIP 22K 5% 1/16W	
R24	1-216-839-11	METAL CHIP 33K 5% 1/16W	
R26	1-216-833-11	METAL CHIP 10K 5% 1/16W	
R27	1-216-849-11	METAL CHIP 220K 5% 1/16W	
R28	1-216-823-11	METAL CHIP 1.5K 5% 1/16W	
R31	1-216-845-11	METAL CHIP 100K 5% 1/16W	
R32	1-216-833-11	METAL CHIP 10K 5% 1/16W	
R35	1-216-827-11	METAL CHIP 3.3K 5% 1/16W	
R36	1-216-821-11	METAL CHIP 1K 5% 1/16W	
R38	1-216-831-11	METAL CHIP 6.8K 5% 1/16W	
R42	1-216-825-11	METAL CHIP 2.2K 5% 1/16W	
R44	1-216-845-11	METAL CHIP 100K 5% 1/16W	
R49	1-216-833-11	METAL CHIP 10K 5% 1/16W	
R50	1-216-845-11	METAL CHIP 100K 5% 1/16W	
R55	1-216-835-11	METAL CHIP 15K 5% 1/16W	
R56	1-216-835-11	METAL CHIP 15K 5% 1/16W	
R60	1-216-829-11	METAL CHIP 4.7K 5% 1/16W	
R65	1-216-833-11	METAL CHIP 10K 5% 1/16W	
R68	1-216-815-11	METAL CHIP 330 5% 1/16W	
R69	1-216-815-11	METAL CHIP 330 5% 1/16W	
R72	1-216-825-11	METAL CHIP 2.2K 5% 1/16W	
R75	1-216-845-11	METAL CHIP 100K 5% 1/16W	
R77	1-216-833-11	METAL CHIP 10K 5% 1/16W	
R81	1-216-845-11	METAL CHIP 100K 5% 1/16W	
R85	1-216-853-11	METAL CHIP 470K 5% 1/16W	
R92	1-216-845-11	METAL CHIP 100K 5% 1/16W	
R94	1-216-845-11	METAL CHIP 100K 5% 1/16W	
R95	1-216-845-11	METAL CHIP 100K 5% 1/16W	
R105	1-216-825-11	METAL CHIP 2.2K 5% 1/16W	
R106	1-216-825-11	METAL CHIP 2.2K 5% 1/16W	
R107	1-216-863-11	METAL CHIP 3.3M 5% 1/16W	
R301	1-216-813-11	METAL CHIP 220 5% 1/16W	
R302	1-216-845-11	METAL CHIP 100K 5% 1/16W	
R303	1-216-819-11	METAL CHIP 680 5% 1/16W	
R308	1-216-809-11	METAL CHIP 100 5% 1/16W	
R310	1-216-845-11	METAL CHIP 100K 5% 1/16W	
R314	1-216-833-11	METAL CHIP 10K 5% 1/16W	
R320	1-216-805-11	METAL CHIP 47 5% 1/16W	
R321	1-216-813-11	METAL CHIP 220 5% 1/16W	
R324	1-216-805-11	METAL CHIP 47 5% 1/16W	
R325	1-216-819-11	METAL CHIP 680 5% 1/16W	
R326	1-216-831-11	METAL CHIP 6.8K 5% 1/16W	
R327	1-216-825-11	METAL CHIP 2.2K 5% 1/16W	
R328	1-216-809-11	METAL CHIP 100 5% 1/16W	

RAGIC

Ref. No.	Part No.	Description			Remark
R329	1-216-833-11	METAL CHIP	10K	5%	1/16W
R331	1-216-805-11	METAL CHIP	47	5%	1/16W
R332	1-216-845-11	METAL CHIP	100K	5%	1/16W
R333	1-216-821-11	METAL CHIP	1K	5%	1/16W
R334	1-216-821-11	METAL CHIP	1K	5%	1/16W
R335	1-216-821-11	METAL CHIP	1K	5%	1/16W
R337	1-216-817-11	METAL CHIP	470	5%	1/16W
R338	1-216-833-11	METAL CHIP	10K	5%	1/16W
R340	1-216-829-11	METAL CHIP	4.7K	5%	1/16W
R344	1-216-801-11	METAL CHIP	22	5%	1/16W
R347	1-216-841-11	METAL CHIP	47K	5%	1/16W
R401	1-216-811-11	METAL CHIP	150	5%	1/16W
R402	1-216-825-11	METAL CHIP	2.2K	5%	1/16W
R403	1-216-831-11	METAL CHIP	6.8K	5%	1/16W
R404	1-216-829-11	METAL CHIP	4.7K	5%	1/16W
R405	1-216-821-11	METAL CHIP	1K	5%	1/16W
R406	1-216-833-11	METAL CHIP	10K	5%	1/16W
R408	1-216-797-11	METAL CHIP	10	5%	1/16W
R411	1-216-835-11	METAL CHIP	15K	5%	1/16W
R412	1-216-823-11	METAL CHIP	1.5K	5%	1/16W
R413	1-216-825-11	METAL CHIP	2.2K	5%	1/16W
R414	1-216-827-11	METAL CHIP	3.3K	5%	1/16W
R416	1-216-827-11	METAL CHIP	3.3K	5%	1/16W
R417	1-216-815-11	METAL CHIP	330	5%	1/16W
R418	1-216-819-11	METAL CHIP	680	5%	1/16W
R419	1-216-831-11	METAL CHIP	6.8K	5%	1/16W
R422	1-216-827-11	METAL CHIP	3.3K	5%	1/16W
R423	1-216-821-11	METAL CHIP	1K	5%	1/16W
R430	1-216-825-11	METAL CHIP	2.2K	5%	1/16W
R431	1-216-813-11	METAL CHIP	220	5%	1/16W
R432	1-216-809-11	METAL CHIP	100	5%	1/16W
R434	1-216-801-11	METAL CHIP	22	5%	1/16W
		< NETWORK RESISTOR >			
RA1	1-233-412-11	RES, CHIP NETWORK 1.0K (3216)			
RA2	1-233-413-11	RES, CHIP NETWORK 2.2K (3216)			
RA3	1-233-413-11	RES, CHIP NETWORK 2.2K (3216)			
		< SPEAKER >			
SD1	1-505-618-11	SPEAKER (SOUNDER)			
		< IC/OSCILLATOR/COUPLER >			
* U1A	8-759-493-86	IC 5A221			
* U2	8-759-538-15	IC AT29LV010A-15TC1			
U3	8-759-464-85	IC MB3805APFV-G-BND			
U5	8-759-360-53	IC AK2334			
U8A	Not supplied				
U301	8-759-171-02	IC DBM2109-TR			
* U302	8-759-493-87	IC TA31181FN			
* U305	1-767-762-11	OSCILLATOR, VOLTAGE VARIABLE			
U306	8-759-464-83	IC MB15U10PFV-G-BND			
U307	1-767-506-11	OSCILLATOR, CRYSTAL (TCO-981G)			
U401	1-759-399-11	COUPLER (DCS314C-0836)			
* U402	1-801-979-11	PA MODULE (FMM5509ZE)			
* U404	1-767-763-11	OSCILLATOR, VOLTAGE VARIABLE			
* U405	8-759-493-88	IC TK11240BMCL			

Ref. No.	Part No.	Description	Remark
		< VIBRATOR >	
Y1	1-767-110-11	OSCILLATOR, CRYSTAL (SX-1)	
**********			
		MISCELLANEOUS	
		**********	
	1-664-321-11	ANT MATCHING BOARD	
ANT1	1-501-886-11	ANTENNA	
SP1	1-759-337-11	RECEIVER (EARPIECE)	